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MAINTAINABILITY ANALYSIS OF MAJOR HELICOPTER COMPONENTS

Thomas N. Cook, et al

Kaman Aerospace Corporation

Prepared for:

Army Air Mobility Research and Development Laboratory

August 1973

DISTRIBUTED BY:



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5- AUTHORIES (First name, middle initial, last name)	
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Approved for public release;	distribution unlimited.
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	U.S. Army Air Mobility Research &
	Development Lab., Fort Eustis, Va.

This report examines the factors responsible for the high man-hour cost of maintaining current-inventory Army helicopters. Major components of six helicopter models were analyzed to identify the significant manhour consumers on each aircraft.

The study was accomplished in three phases. In the first of these, historical maintenance data was gathered, processed and analyzed to assess the overall man-hour requirements on each helicopter. This analysis identified the Significant man-hour consumers on each aircraft in terms of discrete types of maintenance and failure modes, the frequency at which specifically defined tasks occur and the average manhours expended on each task. In the second study phase, the maintenance actions identified as high man-hour consumers via the foregoing analysis were then subjected to a detailed engineering analysis of maintenance task time. In the third study phase, field surveys were conducted at a number of Army aviation maintenance activities operating and maintaining the six helicopter models under study. The surveys were used to compare the analytical findings with the judgement of experienced Army maintenance specialists in the field and to gain a deeper insight into the maintenance requirements of the various aircraft. Using data derived from the analysis, a checklist has been developed for use in maintainability analyses of future helicopter designs.

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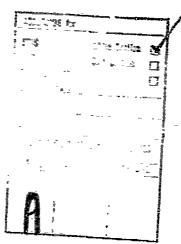
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This investigation is one of a series being conducted on current Army helicopter maintenance operations by the Eustis Directorate of the U.S. Army Air Mobility Research and Development Laboratory.

The effort was performed by Kaman Aerospace Corporation under the terms of Contract DAAJ02-72-C-0065 and was directed at analyzing those factors responsible for the high consumption of maintenance time in the performance of maintenance actions. The analysis was performed on current-inventory Army helicopters. The report provides an insight into the man-hour expenditure as it relates to the maintenance task function. The data derived during this effort was developed into a checklist having potential usefulness in measuring the maintainability of future helicopter designs.

It is believed that the results of this investigation will not only develop better understanding of design characteristics which complicate helicopter maintenance, but will also provide direction for reducing similar complications in future designs.

The technical monitor for this contract was Mr. William B. Sweeney, Military Operations Technology Division.

Task 1F162205A11905 Contract DAAJ02-72-C-0065 USAAMRDL Technical Report 73-43 August 1973

MAINTAINABILITY ANALYSIS OF MAJOR HELICOPTER COMPONENTS

FINAL REPORT

By

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Prepared by

Kaman Aerospace Corporation Bloomfield, Connecticut

for

EUSTIS DIRECTORATE
U.S. ARMY AIR MOBILITY RESEARCH AND DEVELOPMENT LABORATORY
FORT EUSTIS, VIRGINIA

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SUMMARY

This report examines the factors responsible for the high manhour cost of maintaining current-inventory Army helicopters. Major components of six helicopter models were analyzed to identify the significant man-hour consumers on each aircraft. Causes for maintenance were established in terms of failure modes, maintenance frequency, and average repair time. Major component replacement tasks were structured in terms of specific time elements, and important factors affecting maintenance task performance were established.

The study was accomplished in three phases. In the first of these, historical maintenance data was gathered, processed, and analyzed to assess the overall man-hour requirements on each helicopter. This analysis identified the significant man-hour consumers on each aircraft in terms of discrete types of maintenance and failure modes, the frequency at which specifically defined tasks occur, and the average manhours expended on each task. In the second study phase, the maintenance actions identified as high man-hour consumers via the foregoing analysis were then subjected to a detailed engineering analysis of maintenance task time. Using troubleshooting charts, maintenance instructions and test procedures, supplemented where possible by actual aircraft examinations, experienced technical personnel analyzed each high man-hour task to determine the proportion of total time devoted to specific elements of the task. In the third study phase, field surveys were conducted at a number of Army aviation maintenance activities operating and maintaining the six helicopter models under study. The surveys were used to compare the analytical findings with the judgement of experienced Army maintenance specialists in the field and to gain a deeper insight into the maintenance requirements of the various aircraft.

This report documents the results of the three study tasks. Using data derived from the analysis, a checklist has been developed for use in maintainability analyses of future helicopter designs.

Further study is recommended to investigate the characteristics of helicopter designs contributing to the high man-hour cost of maintenance.

FCREWORD

This maintainability analysis of major helicopter components was performed under Contract DAAJ62-72-C-0065 for the Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory, Fort Eustis, Virginia.

The study was conducted under the technical direction of Mr. William B. Sweeney and Captain Charles V. Spain of the Reliability and Maintainability Division. Major Robert Mangum provided technical advice and assistance to the project.

The authors wish to express appreciation for the excellent cooperation extended by the Army field activities who assisted in this work. The technical competence and professional attitude of the many Army personnel involved was a major contribution.

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INTRODUCTION

BACKGROUND AND STATEMENT OF THE PROBLEM

Helicopters typically require greater maintenance than fixed-wing aircraft of comparable size. The reasons for this are widely recognized. First, rotary-wing craft are inherently more complex than their fixed-wing counterparts. Vertical lift capability is not achieved without penalty - it simply takes more systems and equipment to do the job. Secondly, the helicopter is subjected to consistently higher operating stresses. The dynamic systems (rotors, drives, and controls) operate continually at near-design conditions and under high dynamic stress loads. The fatigue life of a majority of helicopter dynamic components is consequently limited, resulting in scheduled replacements and overhauls not encountered with fixed-wing aircraft.

Vibration also contributes greatly to the maintenance problems in helicopters. Components subjected to constant vibration are more prone to failure, thus adding to the maintenance workload. Recent advancements in the technology of vibration isolation and damping promise to make this problem less acute in future helicopters, but vibration is today, and will be for the near future, a significant factor in the helicopter maintenance problem.

Another factor bearing on the helicopter maintenance problem is the normally congested packaging of systems resulting from the unfavorable ratio of hardware to available space. With the constraints on airframe size and weight, space becomes a crucial concern to the designer. The result is often unavoidably poor accessibility for maintenance. More maintenance time is needed simply to get at things, and once there, the task is often prolonged by obstructions and the inability of the mechanic to move freely. Lack of accessibility, although a concern in all types of aircraft, is especially troublesome in helicopters.

The helicopter's operational environment is another important factor in the maintenance problem. Helicopters typically operate close to the ground, which exposes them to a more hostile environment than fixed-wing aircraft. Landing and takeoff from small unprepared fields, hovering over sand and water, moored and unprotected in the elements, exposed and vulnerable to damage from many sources, the helicopter requires greater maintenance than aircraft operating in less harsh environments. The environment also takes its toll in

helicopter maintenance task time. Frequently, the maintenance task must be performed outdoors in the cold, wind, rain or snow with only the most meager facilities. Personnel performance and efficiency consequently suffer.

The problem of helicopter maintenance is of special concern to the Army, since the helicopter is the mainstay of its aviation arm. The Army, therefore, is doing most to identify and remedy the problem. One of the ways in which this is being done is through investigations such as the one for which this report has been prepared. By investigating the causes of current maintenance problems, future designs will benefit from the experience of the past.

The objective of this study has been to quantify maintenance task time in terms of discrete task elements. By establishing the time structure of major maintenance tasks, the elements of work contributing most to the overall man-hour expenditure are identified. Factors of design and support affecting the time to perform maintenance are also established.

In this study, the Army requested an analysis of the maintenance requirements for certain helicopter subsystems and components identified as major man-hour consumers. The generic types of components to be investigated were:

- Tail rotor systems, including drive shafting, drive shaft supporting assemblies, gearboxes, hubs and rotor blades.
- 2. Main rotor hubs
- 3. Auxiliary power plants
- Stability augmentation systems (SAS, SCAS, AFCS, Etc.)
- Transmissions and gearboxes
- 6. Hydraulic servo actuators
- 7. Starters and starter-generators
- 8. Swashplates and supporting assemblies
- 9. Main drive shafts
- 10. Power plant installations

The analysis was to cover these components on the following types of current-inventory Army helicopters:

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- 1. UH-1 Utility
- 2. AH-1 Attack
- 3. OH-6 Observation
- 4. OH-58 Observation
- 5. CH-47 Cargo
- 6. CH-54 Cargo

An initial look at the task posed a fundamental question appropriate to each of the components scheduled for investigation: To what extent are the maintenance man-hours expended on this item due to the frequency of maintenance as opposed to the time required to perform maintenance?

This is a determination of basic importance in an analysis of the maintenance problem. Heavy maintenance requirements are caused, in some cases, by nuisance-type problems which consume little time in correction but which happen much too frequently.

In other cases the frequency of the task may be low, but considerable maintenance time is expended at each occurrence. The result is the same: a heavy maintenance man-hour expenditure. In yet other instances, many man-hours are expended chasing problems which do not exist at all, as when a pilot imagines a "funny beat or shake" (often because of a component's prior reputation for trouble). It was considered probable that each of the components to be studied would involve some combination of these maintenance causes in varying degrees.

In order to arrive at a basic understanding of the maintenance problem, certain items of information were considered to be necessary:

- High Man-Hour Consumers identification of the items (components) which consume the largest share of maintenance man-hours.
- 2. Types of Maintenance Performed for the items identified as high man-hour consumers, the proportion of maintenance time expended on scheduled replacement, repair of failures, no-defect actions, etc.

3. Frequency Versus Repair Time - each maintenance category applicable to the item analyzed in terms of frequency of occurrence and time-to-repair.

This data would provide the basis for constructing the general dimensions of the maintenance requirement in terms of what is done, how often, and how much time it takes. Having reached this basic understanding of the problem, it would be necessary to next probe for the factors underlying heavy maintenance man-hour expenditures. Additional data would be needed for this:

- 1. Failure Modes definition of the item's failure modes to the extent necessary to identify the different types of maintenance tasks performed.
- 2. Elements of Task Time the component elements of maintenance task time, e.g., the time required to fault isolate, gain access, repair or replace, test, etc.
- 3. Factors Affecting Maintenance Time the factors which contribute to the ease or difficulty of the maintenance task, e.g., access provisions, size and weight of the component, complexity of alignments, adjustments, tests, etc.

All of the above data were considered vital to a complete analysis of the maintenance problem. Without such data the analysis would rest heavily on technical judgement, suffering attendant losses in objectivity and validity.

TECHNICAL APPROACH

The technical approach to the maintainability analysis of major helicopter components involved five principal tasks:

1. Data Processing. Historical maintenance data was processed and tabulated for the various helicopter subsystems and components scheduled for analysis. This was accomplished for each of the six helicopter types included in the study. A substantial base of maintenance and flight activity records, from both Marine Corps 3-M and Army TAMMS sources, was used to assemble the historical data on each aircraft. The

process entailed the classification of maintenance tasks according to structured criteria and the calculation of associated statistics.

- Anintenance Requirements Analysis. An analysis was conducted to identify the significant man-hour consumers on each helicopter in terms of discrete types of maintenance and failure modes, the frequency at which specifically defined tasks occur, and the average man-hours expended on each task. This allowed the analysts to rank maintenance problem items, to identify underlying causes, and to determine the areas in which further analysis should be concentrated.
- 3. Maintenance Task Time Analysis. The component replacement actions identified as high man-hour consumers via the foregoing analysis were then subjected to a detailed analysis of maintenance task tile. Using troubleshooting charts, maintenance instructions and test procedures from Army manuals, supplemented where possible by actual aircraft examinations, experienced technical personnel analyzed each of the selected tasks to determine the proportion of the total task time devoted to specific elements of maintenance. This involved a very comprehensive, step-by-step analysis of each task. As a result of this effort, all of the selected maintenance actions were documented in terms of specifically defined elements of maintenance time.

4. Field Surveys. The maintenance requirements and task time analyses, just described, provided the basic statistical foundation for the study. Visits were then made to a number of Army aviation maintenance units to examine aircraft and to interview Army maintenance specialists. The purpose of these interviews was to review the results of the task time analysis with experienced maintenance personnel on each model helicopter. Interviews were augmented, where possible, by on-the-spot examination of component installations and

observation of actual maintenance tasks. Through these surveys, the maintenance tasks analysis was verified by Army personnel with "hands-on" experience and modified where necessary. The survey method also provided the opportunity to gain valuable insights into maintenance problems not obtainable through a strict technical analysis alone.

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5. Development of a Check List. The knowledge acquired as a result of this study was used to develop a guide for use in maintainability evaluations of future helicopter designs. The guide is maintenance function oriented, directing attention to the tasks and design characteristics which contribute most importantly to the maintenance problems with generic classes of components on current-inventory Army helicopters.

This report describes the methods of analysis, and documents the results, conclusions, and recommendations of the study. Maintenance_task analysis data have been grouped in tables by helicopter model and aircraft subsystem. Supporting data have been assembled into appendixes.

ANALYSIS METHODOLOGY

FIELD DATA PROCESSING

The initial study task involved processing historical maintenance data for the helicopter systems and components scheduled for analysis. Two sources of data were used. Marine Corps 3-M data, acquired earlier under Contract DAAJ02-71-C-0047, was used for analysis of the UH-1 and AH-1 helicopters. Navy data on the TE-57A helicopter, included in the same file, was used for analysis of the Army OH-58 helicopter. Data for the OH-6, CH-47 and CH-54 helicopters was obtained from the Army TAMMS.

Marine Corps and Navy Data

Under Contract OFAJ02-71-C-0047, the Navy's Maintenance Support Office at Mechanicsburg, Pennsylvania supplied, via the Eustis Directorate, eight reels of magnetic tape containing 3-M system maintenance, flight and readiness activity for the H-1, H-46, H-53 and H-57 series helicopters. The data covered a two-year period ending June 1971 and included the following 3-M record types:

- 1. Type 11 Maintenance Transaction
- Type 21 Maintenance Transaction
- Type 31 Maintenance Transaction
- Type 71 Readiness Transaction
- 5. Type 76 Flight Transaction

Data files were created for the Marine Corps UH-1 and AH-1 model helicopters and the Navy TH-57 helicopter. Table I shows the selected data base by record type and helicopter model.

	TABLE I. H-1 AND H-57 HELICOPTER DATA BASE				
Yodel	Record	Record	Record	Record	Record
	Type ll	Type 21	Type 31	Type 71	Type 76
UH-le	50,373	15,602	16.595	41.520	33,894
AP-1G	15,457	5,437	4,384	10,879	10,580
AH-1J	1,958	360	250	2,174	1,255
TH-57A	16,909	742	56	9.780	22,703

A computer program using routines from Kaman's existing 3-M data processing system was developed to extract, format and process the data. The initial operation involved creation of separate tape files for each of the two basic helicopter models:

File 1. UH-1E, AH-1G, AH-1J

File 2. TH-57A

Simultaneously, the format of the input records was altered to condense the files and to speed sorting and processing efficiency. Pigure I shows the format of the 80-character, 3-M records as received in the original tape files. Pigure 2 shows the revised 45-character format produced as a result of the initial file extract runs. The program permits the creation of from one to five output files from any number of input files. Any combination of helicopter model types can be placed on each output file for a defined input time period.

Each model type file was sorted on record positions 5 through 15, yielding a file sequence as fellows:

- Flight Records (Type 76) by Aircraft Serial Number
- Maintenance and Readiness Records (Types 11, 21, 31 and 71) by Work Unit Code (maintenance records in malfunction code sequence).

The sorted file was then fed to a tape-to-print run which produced three printed reports:

- 1. Plight Data by Aircraft Serial Number
- 2. R&M Statistical Summary
- 3. Record Count by Organization

Another program option provided a tabulation of flight hours by aircraft serial number and month as required to estimate the average monthly flight utilization for the various models.

The R&M Statistical Summary, a sample page is shown in Pigure 3, provided the summary-level historical data input to the study. The report is in Work Unit Code sequence. Because code-to-nomenclature files were not

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Figure 1. Navy 3-M Record Formats.

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Figure 2. Reformatted 3-M Records.



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Figure 3. R and M Statistical Summary.

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provided with the data supplied by the Navy, the report does not include the item nomenclature. There is a two-line printout of data for each work code reported.

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Total lines are supplied at the component level (for items with a 6th and 7th digit WUC breakout) and at the subsystem, system and all-systems levels. An explanation of the data elements follows:

MTBF - The Mean-Time-Between-Failures for the work unit code. This value is computed by dividing total flight-hours for the model by the number of failures reported (scheduled actions, no-defect actions, cannibalization, etc., having been screened out).

MTBR - The Mean-Time-Between-Replacement (for failure) for the work unit code, obtained by dividing flight-hours by the number of reported replacements due to failure.

FAIL RATE - The rate of failure per 10,000 flight-hours.

REPL RATE - The rate of replacements for failure per 10,000 flight-hours.

ORG MTBM - The Mean-Time-Between-Maintenance at the organizational level, obtained by dividing flight-hours by the total number of maintenance actions reported at Level 1. (organizational level)

INT MTBM - The Mean-Time-Between-Maintenance at the intermediate level, obtained by dividing flight-hours by the total number of maintenance actions at Level 2. (Irtermediate level)

ORG MTTR - The Mean-Time-To-Repair at the organizational maintenance level, obtained by dividing the total reported elapsed maintenance time at Level 1 by the number of actions reported.

INT MTTR - The Mean-Time-To-Repair at the intermediate maintenance level, obtained by lividing the total reported elapsed maintenance time at Level 2 by the number of actions reported.

ORG MH/MA - The average man-hours per maintenance action at the organizational level, obtained by dividing the total reported man-hours at Level 1 by the number of maintenance actions reported.

ORG MH/FH - The maintenance man-hours per 10,000 flight-hours at the organizational level, obtained by dividing Level 1 man-hours x 10⁴ by flight-hours.

INT MH/FH - The maintenance man-hours per 10,000 flight-hours at the intermediate level, obtained by dividing Level 2 man-hours x 10^4 by flight-hours.

NORM RATE - The number of hours per 10,000 flighthours the work unit code component caused the aircraft to be not operationally ready for maintenance.

NORS RATE - The number of hours per 10,000 flight-hours the work unit code component caused the aircraft to be not operationally ready for supply.

FOUR-HIGH FAILURE MODES - The 3-M malfunction codes for the four-high failure modes reported and their percent contribution to total failures (in descending order).

WHEN DISCOVERED DISTRIBUTION - The percent distribution of failures by "when discovered" category within eight groups:

Group 1 - Preflight (Abort)

Group 2 - Inflight (Abort)

Group 3 - Before Flight/Preflight
Inspection

Group 4 - Between Plights/Postflight or Daily Inspection

Group 5 - Inflight (No Abort) / Test Flight

Group 6 - Calendar Inspection

Group 7 - Other Inspection

Group 8 - All Other

PRCNT ERROR CAUSE - The percent of total failures caused by maintenance or operator error.

PRCNT ENVMT CAUSE - The percent of total failures caused by weather or environmental factors.

The R&M Statistical Summaries were used to provide the principal statistical input to the data analysis task. From this report, the analyst selected, by work unit code, the components for which more detailed maintenance data was needed.

Figure 4 shows the overall data processing flow used for the study. Operations shown enclosed in the dash-lined area are those completed under Contract DAAJ02-71-C-0047. The additional data processing requirements shown were completed under the present study.

One of the two additional reports produced from the Marine Corps and Navy data was also used extensively in the study. This report, Maintenance Summary by Malfunction and Disposition, Report 3M004, is shown in Figure 5. The report arrays reported maintenance actions by malfunction code and type of action taken in a matrix-type display. The total man-hours and elapsed maintenance time are printed for each malfunction category. The average manhours per maintenance action is also printed. Totals are printed for line maintenance, shop maintenance and the sum of both levels for the work unit code. This report was used to establish the types of maintenance being expended on the component, the relative frequency of each type, and the average man-hours involved.

The second report produced under the study is the Detailed Maintenance Action List, Report 3M030, shown in Figure 6. Each line of the report represents a separate maintenance transaction. Report content is specified with a series of input parameter cards which identify the criteria for inclusion or exclusion of a transaction from the report. For example, the analyst could request a report containing failure-type actions only. Among the items of information contained in the report are type of maintenance, maintenance level, when alsowered code, malfunction code, quantity, man-hours, and elapsed maintenance time. This report was used by the analyst during the task classification and analysis procedure. It was also used in cases where summarized data was thought to be inaccurate or incomplete to determine the nature of suspected errors and omissions.

The three reports described above were produced for the UH-1E, AH-1G/J and TH-57A helicopters.

The generic component types specified by the Army were translated into work unit codes for the UH-1E, AH-1G/J and TH-57A helicopters. These codes were later used to

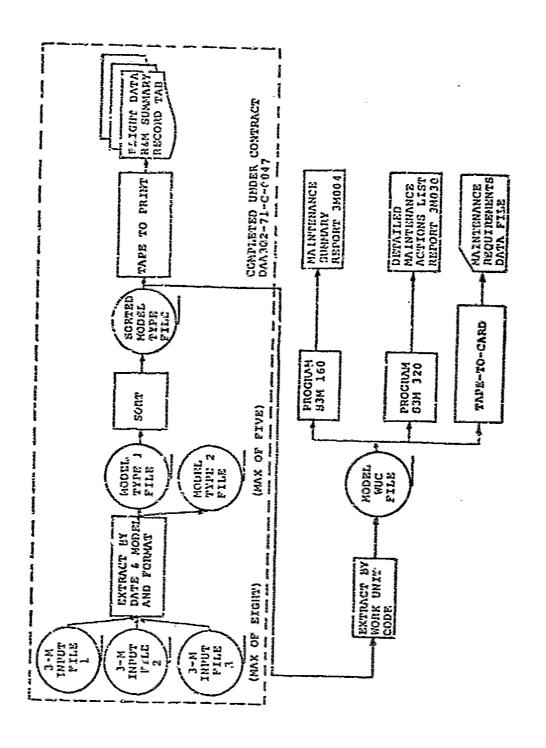


Figure 4. Data Processing Flow.

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Maintenance Summary by Malfunction and Disposition. Figure 5.

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Detailed Maintenance Actions List.

Figure 6.

extract specific components from the computer-processed data for use in the maintenance requirements analysis. For each of the generic component types, work unit codes were extracted from the respective 3-M Work Unit Code Manual, covering the end assembly and each of its significant subassembles (where pertinent). These codes were then arranged to show logical groupings of components where the sequence of codes in the manual did not provide this. Table II shows an initial listing of typical work unit codes for the AH-1G prior to the statistical screening which took place later.

TABLE II.	TYPICAL WORK UNIT CODE EXTRACTION, AH-IG HELICOPTER
Work Unit Code	Component Nomenclature
26111	Main Drive Shaft Assembly
26211	Main Transmission Assembly
26212	Plate Assembly
26213	Breather Vent
26214	Manifold
26215	Coupling
2621C	Mast Assembly
2621E	Main Input Quill
26244	Oil Pressure Relief Valve
26248	Oil Pressure Switch
26411	Tail Drive Shaft Assembly
26412	Clamp
26413	Hanger Assembly
26414	Intermediate Gearbox
26415	Tail Gearbox

From the tape data files generated for each of the three helicopter model-types, punched card files were produced to cover those components selected for further analysis (Figure 4). The criteria for inclusion of components in the file is described in the following section on Army TAMMS Data. The file format is shown in Figure 9.

Army TAMMS Data

Data for analysis of maintenance requirements on the OH-6, CH-47 and CH-54 helicopters was supplied by AAMRDL. It consisted of Army TAMMS data processed by the Northrop Corporation and published in hard-copy printouts. The data processing and editing operations performed by Northrop are explained in their report on the CH-47 helicopter. (1)

The TAMMS data is arranged in volumes by helicopter model, one volume each for the OH-6A, CH-47A and CH-54A. Each volume is prefaced by several indexes which rank components on the basis of maintenance rate, man-hours, and job average. The index was screened to match specific components on each helicopter model to the generic component list. This resulted in a list of specific components, identified by part number and/or stock number, for which maintenance data was to be extracted from the detailed data sheets.

Figure 7 is a sample page from the TAMMS data printout, showing those portions of the data used for the analysis. The report referenced above explains the methodology used by Northrop to classify data into the action categories shown. The categories denoted by the numbers 1 thru 13 in the left margin of the table are those which were selected for the maintenance requirements analysis.

Specific actions were eliminated if the action rate per 10,000 hours was less than 5% of the rate for the component total. The malfunctions for each action were also eliminated if the malfunction comprised less than 5% of the total for that action. This was done to reduce the amount of data to be processed without significantly affecting the results.

⁽¹⁾ Bado, J. A., MacCarley, J. A. et.al., MAINTENANCE DATA TABULATIONS, CH-47A, Northrop Corporation, Report WSDS 72-5, July 1972. Contract DAAJ02-71-D-0002.

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Figure 7. Thims Data Printout

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The logging of malfunction data onto punched cards was accomplished in the following manner. The thirteen actions to be considered were assigned an action number (column 9) and a segment number (column 14: Figure 8: Column 10 was used to indicate whether the maintenance was performed on (=1) or off (=1) the aircraft. The malfunction code (columns 11 this 13) was derived from the Navy's standard malfunction code set (3-M) by matching the narrative description of the malfunction given in the Northrop reports. Examples of the three-digit malfunction codes used are:

Malfunction	
Code	Malfunction
070	Broken
615	Shorted
169	Incorrect Voltage
374	Internal Failure
900	Burned
799	No Defect
800	No Defect - Removed to Pacilitate Other Maintenance
804	No Defect - Removed for Scheduled Maintenance

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The procedure for filling out columns 15 and subsequent of the data cards is discussed next with reference to Figures 7 and 9.

The last row of Figure 7 contains the action rate and raintenance rate (index) totals for the component These two values (x 1000) are entered in card fields 9 and 10 respectively, of Figure 9. The component nomenclature is entered in field 11.

In the second row of Figure 9, field 5, the action code corresponding to "Remove/Replace (A)" - code 6 - has been entered. It is followed by the action rate (837) and manhours index (1546) for that action.

				COL	HN		
		9	10	11	12	13	14
	ACTION	ACTION	ON/OFF		AL ODE		SECIMENT
1.	REMOVE/REPLACE (A)	- 6	1				1
2.	REMOVE/REINSTALL (L)	6	1				2
3.	REMOVE (R)	4	1				0
4	INSTALLED (S)	5	1				. 0
5.	TESTED (J)	1	1				0
6.	CHECKED, SERVICE (P)	1	1				0
7.	CHECKED, NRTS (M)	8	2				0
8.	CHECKED, NOT REP. (N)	8	2				0
9.	SERVICEABLE (A)	1	2				0
10.	ADJUSTED (B)	2	1				0
11.	REPAIRED (C)	3	-				0
12.	REPAIRED (B)	3	2				0
13.	REBUILT (D)	7	2				O
	COMPONENT TOTAL	0	0	0	0	0	0

Figure 8. TAMMS Data Extraction Code System.

The next five card entries represent the malfunction codes contributing at least 5% to the action rate for the maintenance action. The values in field 9 for these cards are percent (x 10) of the action rate (837) entered in field 9 of the action summary card.

The above procedure was carried out for all of the components selected for analysis on the OH-6A, CH-47A and CH-54A helicopters. This produced three punched-card files, to be combined with those generated by computer for the other three model-types, for use as input to the maintenance requirements analysis.

The TAMMS data, as received, was organized by component part number and/or stock number. In order to provide for a data display, compatible with that used for the Marine Corps data, work unit codes had to be assigned to the components selected for each of the three helicopter models: OH-GA, CH-47A and CH-54A. Codes were developed for each component using the appropriate system code from the Navy's 3-M work unit code structure followed by the number representing the sequence of that component in the man-hour index from the Northfop report.

A gearbox on the CH-47A would, for example, have been assigned system code 26 (Drives). If that gearbox appeared as the 28th item in the man-hour sequenced index in the CH-47A data volume, the complete work unit code assignment would have been - 26028. This system related components to a common system arrangement for both sets of data. Using the index sequerce number to complete the work unit code also provided a ready cross-reference to the Northrop reports. The work unit codes thus generated were entered in field 3 of the punched card sets as shown in Figure 9.

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Figure 9. Punched Card Format, Maintenance Requirements Data File.

MAINTENANCE REQUIREMENTS ANALYSIS

One requirement of this study was to identify the failure modes and maintenance requirements which generate the high man-hour consuming tasks on each of the six helicopter models. The data processing tasks just described provided maintenance data for each of the aircraft upon which an analysis of maintenance requirements was based.

The purpose of the maintenance requirements analysis was to identify the significant man-hour consumers among the list of generic components being analyzed and to isolate the actions and failure modes which contribute most heavily to the maintenance burden on each component. The maintenance data on each aircraft was screened to eliminate from further study components which historically did not represent a significant share of the maintenance burden on that aircraft. The general guideline used was to drop components which did not contribute at least .5% to the overall man-hour per flight-hour rate. This was not rigidly adhered to in every case, however. Certain components which revealed a high overall job average or an excessive action rate were retained despite having failed to meet the general cutoff criteria on man-hours. In other cases, components which exceeded the cut-off criteria were dropped because of extenuating factors - an excessively high cannibalization rate for example.

After the component screening was completed, data on each component was analyzed to extract the high man-hour contributors by type of action and cause. Maintenance records were grouped into one of the following action-type categories:

- 1 Check
- 2 Adjust
- 3 Repair
- 4 Remove
- 5 Install
- 6 Replace
- 7 Rebuild
- 8 NRTS (Not Repairable This Station)

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Action categories which did not contribute at least 5% to the man-hour rate for the component were dropped. Next, causes within each action category were examined by malfunction type code. Failure modes or reasons for maintenance which contributed less than 2.5% to the action rate for the component were also dropped. (Action rate rather than man-hour rate was used as the criterion because the TA-MS data as formatted did not show the contribution to man-hours by cause). The result of this procedure was to distill the overall maintenance history on each component down to those actions which contributed at least 5% of the component man-hour rate and those causes within actions which contributed at least 2.5% of the component action rate.

The data thus assembled was prepared in punched-card format to facilitate formatting and calculation of required statistics. The format of the card records was shown earlier in the section on TAMMS data processing. The file code structure included codes for the helicopter model, type maintenance action (listed earlier), where performed designation, malfunction or reason for maintenance, and the maintenance level. The model codes used were:

1 - UH-1

2 - AH-1

3 - OH-58

4 - CH-6

5 - CH-47

€ - CH-54

The codes designating where the action was performed were:

1 - On-Aircraft

2 - Off-Aircraft

The Lalfunction or reason for maintenance codes were taken directly from the standard malfunction code set used in the Navy's 3-M Maintenance Data Collection System. The maintenance level codes used were:

- 1 Organizational
- 2 Direct Support
- 3 General Support

A FORTRAN computer program was written to tabulate data from the six punched-card files. Figure 10 is a sample page from the computer printout. The table is arranged by components within the aircraft. Each component is identified by its work unit code and nomenclature.

Within each component, data is tabulated by maintenance action category and reason/failure mode. The following elements of data are printed for each maintenance action:

ON/OFF/A/C - where the maintenance action is performed on or off the aircraft.

the maintenance level at which the maintenance action is performed.

MH/MA AVG - the average man-hours per maintenance action

Total Man-Hours

Total Maintenance Actions

avg NO MEN - the average number of men required per caintenance action as derived from the historical maintenance data. (This statistic was available only for those circraft for which Marine Corps and Nay data was used).

Total Man-Hours
Total Elapsed Maintenance Time

MA/FH RATE - the maintenance frequency in terms of actions per 10,000 flight-hours.

ACTION REASON/FAILURE MODE	NEE	F	Ł۵	AF	PA/ FH RATE	FH	FH	FH	#A/	KH/
15110 SCISSORS/SLEEVE	ASSY						******			
READA REPART OS ANNON OS OS BEOLEGA TEL REPORTUR NOIJANTELOA TEL	CN R	O	2.0	*	24.1 11.5 2.9	10.3	23.7	9.3	2	2
REPLACE OSO WERH, CHAFED, FRAYED 710 BRG FAILING/FALLIY 803 NO-DEF/TIME CHANGE	- '	ני	5.7	*	43.7 35.6 2.5 4.4	27.3 3.2	139.4	54.5 4.4	1	ı
OTHER COMPONENT TOTAL					44.1 111.9					
15115 MAIN ROTOR HUB A	SSY		·							
REFAIR 020 HCAN, CHASED, FRAYED 710 BRG FAILING/FAILTY		C	17.8	2.0 *		3.4	256.1 83.5 123.7	10.0	2	2
REPLACE 020 HORN, CHAFED, FRAYED 190 CRACKED 710 BRG FAILING/FALLTY 803 NO-DEF/TIME CHANGE	-	0	11.1	2.6 . = * *	4.4 3.6	6.9 4.5 3.7	373.4 57.3 52.6 42.9 36.8	8.1 6.3 5.2	1	1
OTHER COMPONENT TOTAL			€, 2 €, 6	2.0	48.3 96.4	50.2 100.0	203.5 833.;	24.4 100.0		
15116 MAIN ROTOR CHT W	T 455	7								
REPAIR 020 WORN, CHAFED, FRAYED 970 BROKEN 127 ADJST/ALIGN IMPROPE 135 BINDING/STUCK/JANNE 410 LACK OF/IMPROP LUSE	ર D	O	2-0	1.5	8.0 2.0	5.7 14.3	0.5 0.8 0.2	4.6 8.2 - 1.7	ì	d ve de
REPLACE 920 NORN, CHAFED, FRAYED 970 BRGKEN 730 LOOSE	CN	0	1.4	1.5	1.1 0.2 0.5 0.2	2.9	0.9	2.3 9.0	2	2
OTHER COMPONENT TOTAL			1.2 1.7	1.2 1.5			1.1			

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Figure 10. Mairtenance Requirements Data Format.

Total Maintenance Actions x 10,000 Aircraft Flight Hours

MA/FH FCNT - the percentage contribution of this maintenance action to the total maintenance frequency for the component.

= Total Actions (This Action) x 100
Total Actions (Component)

MH/FH RATE - the maintenance rate in terms of manhours per 10,000 flight hours.

> Total Man-Hours x 10,000 Aircraft Flight-Hours

MH/FH PCNT - the percentage contribution of thus maintenance action to the total maintenance rate for the component.

Total Man-Hours (Action) x 100
Total Man-Hours (Component)

RANK MA/FH - the ranking of this action in terms of the overall component maintenance frequency (maintenance actions per 19,000 flight-hours).

RANK MH/FH - the ranking of this action in terms of overall component maintenance rate (maintenance man-hours per 10,000 flight-hours).

Following the summary line for the maintenance action is a breakout of the reasons for maintenance and failure modes for that action. The code and description are followed by the action rate and percent contribution to total actions for that reason/mode. For the three helicopter models using Marine Corps and Navy data (UH-1, AH-1 and OH-58), the manhour rate and percent contribution to total man-hours are also printed.

In cases where certain maintenance actions have been screened cut of the data for having failed to meet the cutoff criterion or where the data could not be properly categorized because of errors or omissions, the balance between the sum of the tabulated actions and the component totals is shown as "OTHER". This line immediately precedes the "COMPONENT TOTAL" line.

Tables III thru VIII contain the overall repair and component statistics for the six helicopter models developed from this analysis. Three additional tabulations for each of the six helicopter models, ranked by average man-hours per task, are contained in Appendixes I thru III. Appendixes I and II contain rankings of on-aircraft and off-aircraft repairs respectively. Appendix III contains a ranking of component replacement actions. The complete results of the maintenance requirements analysis for the six helicopters are contained in Appendix IV.

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TABLE III. COMP	ONE	NT RE		TR								
STAT	IST	ICS,	ОН	- 58	HE	LIC	COP	ace Ter	Men	T		
Component Code and Nomenclatur		Type Actio		On/O Acft	f f	Lev			1	yg lan-	MH/	
14123 Swashplate/Support Assem	bly	Replac Repair	9	CN CN		D.S.		. 85 61		.2	21	
14142 Cyclic Servo Actuator		gepiace	4	ON ON		CRG. ORG.		80) j 2.	. 5	31	
14144 Collective Servo Actuator	.	kplace kepair	1	ON		ORG.	5	459 882,	1	.3	49 4	3
15111 Main Rotor Hub	R	eplace	Ī	on On	1	DRG. D.S.		,818 ,762	1.	3	7.	1
15114 Hub Grip Reservoir	I	epuir Eplace	Ì	ON ON).S.	l	336	7.	G	154 2,259	3
15211 Tail Rotor Hub	R	epair eplace	-);}	0	RG. RG,	l ,	695 82			4 <u>1</u> 1,819	
15215 Tail Potor Blade	Re	Pair	4 .	H		왕. .s.		631 719			206 226	
22500 7-63 Engine	Re	place pair	2	n N		.s. RG.		149 990			381 185	- Martin Catalogue
22561 Fuel Pimp	1	place	ļo		ı	s.	1	474	28.9	5	,112	-
22562 Main Fuel Control	Re	Place Pair	C		D. OF	s. G.	1,)26 21	2.8		301 219	A STATE STATE OF THE PARTY OF T
22563 Governor	Re:	place pair	01	-		a. G.		05 12	3.4 1.7	-	283 410	WGDWRITT ATHREE
	Rej Rej	place Mair	C:		D. O≅		1,3 9	16	3.0 2.0	lopted amore delay	229	
22566 Fuel Chrck Valve	Per Per	lace air.	ON CN		D.; GR		1,6	13	2.2	t Britte up? Bedudennan	213 137	
22572 Lube Filter	Rep Pep	lace	OX		ORG	;. <u> </u>	4,76	52 1	1.0	Tankhar est bring	43 25	
22593 Ignition Lead	ge.p.	lace	CS CN	and the analysis of the analysis of	ORG ORG	•	1,1	19	2.5 1.7		216	
6111 Engine to Trans. Drive	Rep	1	OK OW	PANENTIAL PARENTE	ORG	- 10	, OQ	0	1.1	Market Bentalenson	29 11	
6210 Main Transmission	Repa	ir	OS	AND REAL PROPERTY.	org Org	- [., 69 37	5 3		1,6	30	
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TABLE III - Continued											
Component Code and Momenclature	Type Action	On/Off Acft.	Levē1	ATEX	Avg Man- Hr	MH/FH x 105					
36411 Tail Rotor Drive Coupling	Replace Repair	ON ON	org.	10,000 1,818		6 53					
25613 Xenger Bearing	Replace Repair	ON ON	ORG. ORG.	2,222 474		126 433					
26416 Tail Rotor Géarbox	Replace Repair	ON CN	ORG. ORG.	3,226 331		147 °					
29310 Droop Compensator	Replace	ON	ORG.	2,857	2.1	73					
25411 Oil Cooler	Replace Repair	ON OH	ORG. CRG.	1,695 2,857		224 34					
29711 Anti-Ica Control Actuator	Replace Repair	ON ON	ORG.	4,762 7.143	2.2	46 15					
42111 Starter Generator	Replace Repair	ON ON	ORG.	270 185	2.0	742 909					

TABLE IV. COMPONENT REPAIR AND REPLACEMENT STATISTICS, OH-6 HELICOPTER												
Compo	nent Code and Po≤agolature	Type Action	On/Of^ Acft.	7. S. A. S.	ETSH.	Avg Hen- Hr	HU/FU 105					
14032	Kain Rotor washplate	Replace	l On	D.S.	1,111	7.2	-648					
15003	Tail Rotor Hub Assembly	Paplace Repair Papair	On Cff On	9.5. D.S.	429 93 9,091	10.0	747 10,773 48					
15010	Main Rotor Aub Assembly	Replace Eepair	On On	D.S.	662 185		1,257 4,355					
15047	Main Rotor Damper Assembly	Replace	Ω÷	Drg	316	1.2	375					
15153	Tail Rotor Blade	Replace Fepair	Or. Oź£		4,762 33,333		ŧo					
22007	Engine	Replace Repair Repair	On Off On	D.S. D.S. D.S.	139	14.5 10.0 5.9	8,5 1 0 7,211					
22044	Power Turbine Governor	Replace	On	D.S.	1,031		329					
22054	Gas Producer Fuel Control	Replaçe	Ca	D.S.	633	3.6	585					
22062	Oil Cooler	Replace Repair	On Cn	D.S. D.S.	1,613 25,000	5.1 5.4	316					
2 5110	Engine Gil Filter	Replace	0p	0Fg	850	0.7	\$5					
3 <u>6</u> 013	Main Transmission	Replace Repair	On Off	2.S. D.S.	364 177	15.6 7.0	4,284 3,985					
26017	Tail Rotor Gearbox	Replace Repair	On J	2.5. D.S.	288 195		2,324 2,064					
25019	Hain Drive Shaft	Replace	On !	D.S.	437	2.4	554					
2 <u>8</u> ¢23	Tail Rotor Drive Shaft	Replace Repair	On OEf	D.S. D.S.	498 212	3.7 7.6	774 932					
26126	Bearing Sea)-Tail Rotor Gearbox	Replace	OD.	D.S.	2,041	J	184					
	Dii Filter-Main Transmission	Replace	дО	Org	1,667	1.0	64					
42055	Starter Generator	Replace	Or.	Org	659	1.2	17. To 1					
			AllECHINAME OF PROPERTY.	HEIDEN PRINCIPAL PROMETERS HEIDEN HEI	North Cartes designation and Green	PPW (British Hill) Beam Half (but hilbon)	HINGURALANDAY HOURAND KINGURANDA					

TABLE V. COMPONENT REPAIR AND REPLACEMENT STATISTICS, UH-1 HELICOPTER												
}	V4-34-4V44-V0	, 011 1	,	, , , , , , , , , , , , , , , , , , ,								
ļ	dent Code and Momenalature	Type Action	9n/Off Acft.	The August States	THE STATE OF THE S	Avg Pan- Hr	MH/FH 2 105					
l 13118 [Collective Lever Assembly	Replace Papair	On On	Org Org	1,282 637		163 303					
14128	Swashplate/Support Assembly	Replace Repair	On On	Org Org	794 469	10.0 3.4	1,261 734					
P. C.	Flight Control Cylinder/ Valve	Replace Repair	On On	Otg Otg	135 118		2,308 2,087					
15115	Main Rotor Hub Assembly	Replace Repair	l Cn l On	org D.S.		11.1 17.8	3,734 2,561					
151 <u>1</u> 0	Scissors/Sleeve Assembly	Replace Repair	On On	D.S.	229 415		2,489 474					
15218	Main Rotor Counterweight	Replace Repair	On On	Org Org	9,091 2,778		16 72					
Andrew The State of the State o	Tail Rotor Hub Assembly	Replace Repair Repair	On 0ff On	D.S. D.S.	130 249 532	3.9	3,700 1,563 360					
5521 2	Tail Rotor Flade Assembly	Replace	On	D.S.	154	3.7	2,262					
22 200	T-53 Engine	Keplace Repair Repair	02 02 00	D.S. D.S. D.S.	281 781 315	19.2	15,015 2,450 715					
22261	Frel Regulator	Replace Repair	On On	Ozg Ozg	1,887 490	7.8 1.5						
	Main Puel Manifold	Replace Papair Repair	On 710 CC	Org D.S. Org	4,167 50,000 2,381		28					
22253	Starting Fuel Manifold	Peplace Espair	0n 0n	Org Org	16,667 2,941	2.5 1.2						
2 2631	O Star ing Forl Nozele	Asplace Repair	On On	Or g Org	8,667 20,000	4.4 4.8	64 23					
22291	Exciter Unit	Replace Repair	On On	Org	4,752 4,762	1.8	40					
22293		Replace Repair	On On	Org	5,556 4,348	1.8 3.7	32					
26111		Replace Repair Repair	On Off On	Org D.S.	351 870 1,818	3.5 3.7 3.2	996 425 7.78					

TABLE V	- Cont	inued				·
Component Code and Nomenclature		On/Off Acft.	Level	HTEH		ын/ғн k 10 ⁵
26211 Main Transmission	Replace	On	D.S.	1,163	31.4	2,691
2621C Mast Assembly	Replace Repair	On On	D.S.	935 1,449	10.3 1.4	980, n
2621E Main Input Quill-Main Trans	Replace Repair	On On	D.S. D.S.	909 1,235		503 406
2621J Tubiny-Main Transmission	Replace Repair	On On	Org Org	9,091 4,167		15 25
2621K Hose-Main Transmission	Replace Repair	On On	Org Org	6,667 4,167		25 28
26411 Tail Roto: Drive Sheft	Replace Repair	On On	Org .	1,064 1,597		159 98
26413 Tail Rotor Shaft Hanger	Replace Repair Repair	On Off On	org D.S. Org	349 909 1,316	2.5	5 \$9 272 201
25414 Intermediate Gearbox	Replace Repair	On On	Org Org	617 735		5¢1 135
26415 Tail Rotor Gearbox	Replace Repair	On On	Grg Org	410 293		1,197 547
29132 Pillow Block Assembly	Replace Repair	On On	D.S.	12,500 4,762		1.9 27
2923E Particle Separator	Peplace Repair	On On	Org Org	12,500 2,129		15 24
2931J Droop Compensator Cam Box	Replace Repair	On On	D.S. Org	3,226 529		74 242
2931J10 Linear Actuator	Replace Repair Repair	On Off On	Org D.S.	680 1,538 382	2.0	309 127 280
29321 CPK Warning Detector Box	Replace Repair Repair	On Off On	Org D.S. Org	171 179 310	1.8	Q.405 Q.000 474
29421 Oil Tank	Meplace Replace	On On	Org	6,250 2,083] 34 52
29422 Oit Cooler	Replace Repair	On On	Org Crg	3,125 2,331		100

TABLE V - Continued												
Component Code and Nomenclature	Type Action	On/Off Acft.	243	W. W.	Avg Han- hr							
29621 Tailpipe	Replace Repair Repair	0n 0ff 0n	D.S. D.S. D.S.	9,091 33,333 12,500	2.8	All						
42111 Generator	Replace Repair	On On	Ora Ore	862 1,205]]]]						
42211 Starter Generator	Replace Repair	0n 0n	Orđ Orđ	1,235 1,316		259 152						

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TABLE VI. COMPONENT REPAIR AND REPIACEMENT STATISTICS, AH-1 HELICOPTER Component Code and Romenclature Action Acts. Level Miss. Man. Will's Action Acts. Level Miss. Man. Will's No. 10-1 14118 Collective Lever Assembly Replace On Org 4.600 1.6 40 1418 Collective Lever Assembly Replace On Org 5.55 7.5 1,266 1.7 578 1418 Collective Lever Assembly Repair On Org 5.55 7.5 1,266 1.7 578 14141 Flight Control Cylinder/ Replace On Org 5.55 7.5 1,266 1.7 717 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7		Γ	TABLE VI. COMPO		۔ نسب			. — -				
Component Code and Romenclature		Ŀ		NEAT RE STICS,	PA: Afi-	R AN	D RE	PL PTI	SCE	vent	Ē	
14128 Cyclic Swashplate/Support Replace Con Cory 3,442 1.4 41 41 41 41 41 41 4		ì		e ji Acti	ōg.			761		[N	建新 ~	isifs
14128 Cyclic Swashplate/Support Replace On Org 525 7.5 1.728 14141 Flight Control Cylinder/ Replace On Org 326 4.5 574 14141 Flight Control Cylinder/ Replace On Org 326 4.5 574 15115 Wain Rotor Hub Assembly Replace On Org 341 6.9 1.718 15211 Tail Rotor Hub Assembly Replace On Org 342 6.9 1.718 15212 Tail Rotor Hub Assembly Replace On Org 343 6.9 1.718 15212 Tail Rotor Blade Assembly Replace On Org 342 6.9 1.718 15212 Tail Rotor Blade Assembly Replace On Org 342 6.9 1.718 15212 Tail Rotor Blade Assembly Replace On Org 3.6 1.452 15212 Tail Rotor Blade Assembly Replace On Org 0.5 2.174 0.9 15212 Tail Rotor Blade Assembly Replace On Org 0.5 2.174 0.9 15212 Tail Rotor Blade Assembly Replace On Org 0.5 2.174 0.9 15214 Tail Rotor Blade Assembly Replace On Org 0.5 2.174 0.9 15215 Tail Rotor Blade Assembly Replace On Org 0.5 2.174 0.9 15216 Fuel Regulator Replace On Org 0.5 2.20 0.4 2.2 15217 Oil Rose Replace On Org 2.321 1.2 56 15218 Main Drive Sheft Replace On Org 2.321 1.2 56 15218 Main Imput Quill Assembly Replace On Org 0.5 2.321 1.2 1.5 15218 Rain Transmission Replace On Org 5.821 1.4 2.3 15218 Rain Transmission Replace On Org 5.821 1.4 2.3 15219 Tail Rotor Drive Sheft Replace On Org 5.821 1.4 2.3 15219 Tail Rotor Drive Sheft Replace On Org 5.821 0.6 1.5 15210 Tail Rotor Drive Sheft Replace On Org 5.821 0.6 1.5 15210 Tail Rotor Drive Sheft Replace On Org 5.821 0.6 1.5 15210 Tail Rotor Drive Sheft Replace On Org 5.821 0.6 1.5 15210 Tail Rotor Drive Sheft Replace On Org 5.821 0.6 1.5 15210 Tail Rotor Drive Sheft Replace On Org 5.821 0.6 1.				Repa					€,(30	1.6	
14141 Flight Control Cylinder/ Replace Cm Org 244 3.2 1,305 15115 Hain Rotor Hub Assembly Replace Cm Org 303 3.5 1,144 Replace Cm Org 303 3.5 1,144 Replace Cm Org 303 3.5 1,144 Replace Cm Org 341 6.9 1,512 Repair Org Org Org 665 11.7 Replace Cm Org 0.5. 665 11.7 Replace Cm Org 0.5. 665 11.7 Replace Cm Org 0.5. 706 2.5 Sepair Org Org 0.5. Sepair Org 0.5				Repai	ce l		Org		5	es :).s	1,284
15115 Main Rotor Hub Assembly Replace On Sepair Off D.S. 685 11.77 1.715 368 11.77 1.715 368 11.77 1.715 368 11.77 1.715 368 11.77 1.715 368 11.77 3.68 11.77 3.68 11.77 3.68 11.77 3.68 11.77 3.68 3.77 3.7	1			Repla	ce i	On .	loze			44 3	. 2	1.399
15211 Tail Rotor Hub Assembly Replace Gn Grg 400 1.5 365 1.7723 365 1.5212 Tail Rotor Blade Assembly Replace Gn Grg 5.5. 241 3.6 1.452 335 1.522 704 2.5 335 704 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 3.5	HANNES HANNES	151	15 Main Rotor Emb Assembly	i Repla	ر الأحراث	Om	Özə	GHADIMHA		1	1	1
15212 Tail Rotor Blade Assembly Replace Cn D.S. 704 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 335 705 2.5 3.5 478 3.7 773 2.5		1521	ll Táil Botór Hob Nascoblu	Recal		Ōĸ	D.S	a 🛔	5	85 11	.7 🛙	1,715
Repair	1			Bepair		Off	D.S.				. S.	
Repair Off D.S. 292 43.6 24,721 Repair Off D.S. 2,381 15.3 441 D.S. 722 3.0 466 D.S. 722 3.0 666 D.S. 723 D.S. 724 D.S. 725 D.S. D.S. 725 D.S.	1			Repair	# Market M		D.S. D.S.		47 2,17	d 3. € 9.		
22261 Fuel Regulator Replace On Org 3,835 5.0 200 Repair On Org 3,835 5.0 200 Repair On Org 2,382 1.2 55 Replace On Org 2,382 1.2 55 Repair Off O.S. 685 3.3 469 Repair Off O.S. 685 3.3 469 Repair On Org 0.5 1.1 3.4 \$22 Repair Off O.S. 685 3.3 469 Repair On D.S. 775 8.3 1,676 Repair On D.S. 746 6.4 555 Repair On Org 0.5 746 Repair On Org 0.5 74692 1.3 17 Repair On Org 5,882 1.4 21 Repair Tail Rotor Drive Sheft Replace On D.S. 1,687 27.2 2,592	PINES, WASHING			- Coair	. [[H.	D.S.	1 1	Z.38	ľ 15.	\$ 	441
22277 Oil Hose Replace Ding	- T	226]	l Fuel Regulator	Replac		lai .	Ore	Ī	₩		臺	1
26111 Main Drive Shaft Replace On Org 2,802 0.4 22 Repair Off O.S. 685 3.3 469 Repair On O.S. 685 3.3 469 Repair On O.S. 685 3.3 469 Repair On O.S. 775 8.3 1.676 Repair On O.S. 1,138 1.5 157 Replace On O.S. 1,138 1.5 157 Repair On O.S. 2,331 3.5 157 Repair On O.S. 25,852 1.4 23 Repair On O.S. 25,852 1.4 23 Repair On O.S. 27,2 2,505]2	2277	7 011 Hose	Replace		a 4	Ī			9 .:	9	114
Replace On D.S. 775 8.3 1.576 D.S. 1.136 1.5 157 D.S. 1.136 1.5 157 D.S. 1.136 1.5 157 D.S. 1.136 1.5 157 D.S. 746 6.4 555 D.S. 2.331 3.5 157 D.S. 2.331	2	511 <u>1</u>	Nain Drive Sheft	Replace	10		Org		, P (E	§ 6.4		23
2621E Waln Input Quill Assembly Replace On P.S. 746 6.4 559 Repair On O.S. 2,331 3.8 15% 2621J Tobing - Main Transmission Replace On Repair On Org 7,692 1.3 17 2621K Hose-Main Transmission Replace On Repair On Org 7,692 1.3 17 2621K Hose-Main Transmission Replace On Repair On Org 5,882 1.4 23 26211 Main Transmission Assembly Replace On D.S. 1,687 27.2 2,500 26611 Tail Sobor Drive Shaft Replace On D.S. 1,687 27.2 2,500 26611 Tail Sobor Drive Shaft Replace On D.S. 1,687 27.2 2,500	1 2	\$21C	Yest Assembly	Replace		Ĭ		Mallikhe-anchwan	5 85	3.3		4
2621J Tabing - Main Transmission Replace On Gry 25.000 1.1 55 2621K Sose-Main Transmission Replace On Org 7.6572 1.3 17 2621 Main Transmission Assembly Replace On Org 5,852 1.4 23 2641 Tail Robor Drive Shafe Replace On D.S. 1,687 27.2 2,500] 	ZIE	Halm Toput Ouill Assembly	i Replace	10		Ď.Š.	Ī	,136	1.8	1	153
2621K Sose-Hair Transmission Replace On Org 7,592 1.3 17 26211 Main Transmission Assembly Replace On Org 5,882 1.4 23 26211 Tail Robor Drive Shafe Replace On P.S. 1,687 27.2 2,500	26	21J	Tobicy – Kain Tracemistics	i Romat –	I a.		o.s.	Z,	38) 	3.€		蚞
26211 Hain Transmission Assembly Replace On D.S. 1,687 27.2 2,582	i .			 *ebcil			주물	7 _*	69 2	1.3		₫
Accepted Tail Indian Drive Shafe September Septemb					1 44		Z y	5, 5,	u Sy	1.4 0.4	PRINCIPLE WRITERS.	24 14
Terpeti G G 1.0	264	22	Tail Notor bries cars.	Poplace		1	Ì				i i	畫
				espair -						4. 4		

TABLE V	I - Con	tinue	1		_	
Component Code and Homenclature	Type Action	On/Off Acft.	Level	мтвм	Avg Man- Hr	ин/гн х 105
26413 Hanger Assembly	Replace Repair	On Off	Org D.S.	88 312	1.9	2,150 595
26414 Intermediate Gearbox	Replace Repair	On On	Org Org	427 885	2.6 0.8	
26415 Tail Rotor Gearbox Assembly	Replace Repair	On On	Org Org	369 620	4.8 0.8	1,303 129
29132 Pillow Block Assembly	Replace Repair		D.S. D.S.	4,000 7,692	1.3 0.5	33 11
29133 Tripod Assembly	Replace Repair	On On	p.s. p.s.	1,406 1,493	2.0 1.5	142 103
2931J Droop Compensator Cam Box	Replace Repair	On On	Org Org	3,030 452	2.3 0.7	77 155
2931J10 Linear Actuator	Replace Repair Repair	On Off On	Org D.S. Org	452 1,205 303	2.3 1.2 1.0	346 191 346
29321 RPM Warning Detector Box	Replace Repair Repair	On Off On	Org D.S. Org	201 224 189	2.4 1.1 1.2	1,193 493 635
29422 Oil Cooler	Replace Repair	On On	Org Org	3,448 3,030	4.2 2.6	123 87
42211 Starter/Generator	Replace Repair		D.S. D.S.	1,5J7 826	3.3 2.2	207 269
575Cl SCAS Control Assembly	Replace Repair	On On	D.S. D.S.	4,000 4,762	2.0 1.1	50 24
	ALIBA VANIME SE ESTADA A CHARACTER SE ESTADA CHARACTER S	Best Study best Page At Separate				
	Histophine, at princip	Henrykypilagen-dellyggenere ppg	Tamas segments	newspecial data from passes		
	New prince of Ellings Base (August Base)	ingalines dept 10 madesage	nation handelperson of source parties of source	AMAZONI STANIA AMAZONIA	Annual Principle Control	
	PERSONAL TANDES SERVICES	place "and suggisternity below to	Management (Minimal Stage, says to		

TABL	E VII. COMPONENT REP STATISTICS, C				T		
Compon	ent Code and Nomenclature	Type Action	On/Off Acft.	Level	нтвн	Avg Man- Hr	커버/FH x 10 ⁵
14021	Swashplate Control	Replace Repair	On Off	D.S.	357 1,961	14.1 12.0	3,952 608
14069	Drive Arm Assy - Trans.	Replace Rapair	On Off	D.S. D.S.	324 1,493		555 403
15008	Rotary Wing Head Assy.	Replace Repair	On Off	D.S. D.S.		19.8	9,839 20,039
15102	Shock Absorber	Replace	On	Org	332	2.3	693
15133	Rotary Head Boot Assy.	Replace Repair	On On	Org Org	228 2,564		833 60
15170	Rotary Wing Head Oil Tank	Replace	On	Org	,256	1.2	469
15234	Spring Droop Stop	Replace	On	Org	840	1.7	203
15271	Droop Stop-Static	Replace Repair	On On	Org Org	8,333 12,500		· 19
22004	Turbine Engine	Replace Repair	On Off	D.S. D.S.			99,847 39,930
22074	Fire Detection Sensing Element	Replace Repair	On On	Org Org	121 1,667	1.7 2.3	1,407 137
22161	Engine Oil Pump	Replace Replir	On On	Org Org	1,639 7,692		330 27
22128	Power Turbine Control Actuator	Replace	On	brg	575	2.3	400
22157	Engine Starter	Replace	On	Org	465	2.6	558
22310	Engine Exhaust Cone	Replace	On	Org	1,923	1.7	89
22357	Engine Tailpipe Assy.	Replace	On	brg	10,000	1.8	19
24009	Aux, Power Unit	Replace Repair Repair	On On Off	Org Org D.S.	192 1,351 645	2.0	2,818 150 18,250
24169	APU Hydraulic Pump- Motor	Replace Repair	On Off	Org D.S.	3,704 7,692	3.1 18.9	90 253
2430€	APU Fuel Pressure Switch	Replace	On	Org	3,226	1.4	44.

TABLE VI	II - Cont	inued			······································	
Component Code and Nomenclature	Type Action	On/Off Acft.	Level	мтвж	Avg Han- Hr	мн/ғн х 10 ⁵
24576 APU Fuel Foost Pump	Replace	On	Org	4,167	1.8	43
26010 Combining Trans.	Replace Repair Repair	On On Off	D.S. D.S.	183 699 637	7.6 1.2 23.9	4,160 16 3,757
26012 Synchronizing Shaft Asey	Replace	On	Org	131	2.4	1,837
26013 Aft Trans. Assy.	Replace Repair	On On	D.S. D.S.	274 140		15,562 214
26016. Forward Trans.Assy	Replace Repair Repair	On On Oi	D.S. D.S. D.S.	407 1,429 1,163	0.5	9,594 39 2,079
26017 Engine Trans.Assy	Replace Repair	On Off	Org D.S.	2°1 204	4.5 12.2	2, <u>1</u> 34 4,026
29019 Trans. Shaft Assy	Replace Repair	On Off	D.S.	407 1:754	2.1 13.9	517 737
26038 Aft Rotor Drive Shaft	Replace Repair Repair	On On Off	D.S. D.S. D.S.	#93 6,667 3,030	19.7 2.6 10.4	2,202 39 340
26084 Adapter Assy - Rotor Driv	e Replace Repair	On Off	D.S.	1,639 1,020	2.2 8.0	134 787
26036 Output Seal-Aft Trans.	Replace	On	Org	465	15.0	3,220
26173 Chip Datector-Engine Trans	Replace Repair	On Go	Org Org	1,389 3,226	1.1 1.1	7 5 34
42054 A/C Generator	Replace Repair	On On	Org	441 1,493	1.8 9.9	408 663
45011 Rydraulic Servo Cylinder	Replace Repair	On Off	Org D.S.	225 141	3.7 12.0	1,644 9,481

	TABLE VIII. COMPON STATIS	ENT REP	AIR AN H-54 I	ND REI	PLACE OPTER	MENT	
Compo	nent Code and Nomenclature	Type Action	On/Off Acft.	Level	нтвн	Avg Man- Hr	1H/FH × 105
15006	Tail Rotor Blade	Replace Repair Repair	On On Off	Org D.S. D.S.	114 83 63	2.3	
15007	Main Rotor Head Assembly	Replace	0.	D.S.	260	28.7	11,059
15016	Rotor Damper Assembly	Replace Repair	On Cff	Org D.S.	311 1,042		1
15021	Tail Rotor Head	Replace Repair	On On	Org Org	323 3,125		
15079	Droop Restrainer	Replace	On	Org	228	1.5	558
15208	Bearing - Pitch Change Link	Replace	On	Org .	380	1.4	390
22005	Engine	Replace Repair Repair	On On Off	D.S. D.S. D.S.	85 199 407	6.9	62,139 3,473 19, 688
22028	Tailpipe Assembly	Replace Repair	On Ga	D.S. D.S.	88 781	1.8 2.4	2,042 311
22037	Fuel Control	Replace	On	D.S.	444	6.4	1,438
22043	Particle Separator	Replace	On.	Org	1,333	5.5	612
22100	EAPS Blower	Replace	On	Org	667	3.4	510
22113	Anti-Ice Valve	Replace	On	Org	667	1.3	195
22150	Starter	Replace	Oze	Org	1,333	2.6	155
22389	Anti-Ice Sensor	Replace Repair	On On	Org Org	4,762 9,091	1.9 0.5	41
24014	APP Engine	Replace Repair	On On	D.S. D.S.	4,762 719	5.4 60.0	137 2.346
	APP Clutch	Replace Repair Repair	On On Off		621 4,762 1,583	2.3 2.8 16.0	370 59 1,027
24090	APP Fuel Control	Replace	On	Org	518	3.4	655
24159	APP Starter	Replace	On	Org	781	3.1	396
24187	APP Fuel Pump	Replace	οn	Org	3,125	4.4	141

AND THE PROPERTY OF THE PROPER	TABLE VI	II - Co	ntinu	∍đ			Mary March March
Compon	ent Code and Nomenclature		On/Off Acft.	Leve.	HTEM		Ma/FH x 105
26011	Main Transmission	Replace	On	D.S.	444	97.7	21,992
26019	Tail Rotor Gearbox	Replace Repair	On Off	D.S. D.S.	407 1,887	20.8 24.0	5,119 1,264
26029	Tail Rotor Drive Shaft Bearing	Replace	W SHIPPORTH WAS A STATE OF THE	D.5.	126	4.7	3,721
26040	Main Input Seal-Main Trans- mission	Replace	On	D.S.	360	9.2	2,559
26062	Interpediate Gearbox	Replace Repair	On On	D.5.	549 847	7.1 2.8	1,294 330
26066	Oil Pump - Main Transmis-	Replace	On	c.s.	719	5.0	695
26883	Rotor Brake Seal - Main Transmission	Replace	On	D.S.	467	7.1	1,519
26112	Brake Disc - Main Trans-	Replace	l On	D.S.	623	3.9	628
26224	Tail Rotor Shaft Assembly	Replace	On	D.S.	1,031	2.6	252
262 60	Chip Detector- Tail Rotor Gearbox	Replace Repair	On On	Org	3,125 1,887	1.6 1.8	51 94
26329	Tail Rotor Shaft Assembly (No. 2-6)	Replace	OL.	D. 5.	1,887	2.5	134
[€213€	Generator	Replace	On	Org	292	2∵0	695
₹ 5010	Main Rotor Servo Unit	Replace Repair	On Off	D.5. D.S.	246 85		1,301 18,832
57027	APCS Servc Unit	Replace Repair	On Off	Org D.S.	1,333 1,887		
57420	AFCS Amplifier	Replace	On	Org	4,762	1.1	24
i Branshi i Bersi ahil ingka		NATIONAL PROPERTY OF THE PROPE	Afficial permanaturing	TATION OF NATIONAL DISTRIBUTION AND AND AND AND AND AND AND AND AND AN		S. KARISHARISHARISHARISHARISHARISHARISHARISH	
Hanifele Agnon Habinath		KANKIRIJANGA (KIKIRI) KANKIRIJANGA (KIKIRI) KANKIRIJANGA (KIKIRI) KANKIRIJANGA (KIKIRI) KIKIRIJANGA (KIKIRIJANGA (KIKIRI) (KIKIRIJANGA (KIKIRIJANGA (KIKIRIJANGA (KIKIRIJANGA (KIKIRI) (KIKIRIJANGA (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRIJANGA (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRIJANGA (KIKIRI) (KIKIRIJANGA (KIKIRI) (KIKIRI) (KIKIRI) (KIKIRIJANGA (KIKIRIJANGA (KIKIRI) (KIKIRIJANGA (KIKIRI) (KIKIR	инајаникалинија	(РЕМІН-МІТІВНИК ПІВ МІТІВНИК ПІВ			Andread in the second s
DATA ACTORNICA HANGOLINA		inversion of the state of the s	NAMES AND STATES OF THE STATES	BARRESHINKUR KURKUR KUR			Made Sales Control Con
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MAINTENANCE TASK TIME ANALYSIS

The maintenance requirements for each component were next examined to identify the significant man-hour consuming tasks. These tasks were then to be analyzed individually to determine the proportion of total task time expended on the specific task elements.

The intent, initially, was to analyze both component repair and replacement actions. It became quickly apparent, however, that tasks other than component removal and replacement could not practicably be treated in an analysis of this type. Examination of the maintenance requirements data revealed in nearly all cases repair tasks on each component. Attempts to identify the nature of the repair tasks were rarely successful, however, because of the limited definition provided in the data. A gearbox may have, for example, reflected a significant incidence of repairs for leaks. The leaks may have been in one or more of several seals, in one or more of many attaching lines and hoses, in the filler port, etc. The repair may have been as simple as tightening a bolt or connection or as complex as replacing a rotating seal. Since all repairs of this type are merged together by virtue of the code systems used, there was no way to establish which types of repairs were actually made, their relative frequency, or man-hour cost. Even if this were possible, the number of different repair tasks to be analyzed would easily order in the hundreds.

Further complicating the problem is the diversity existing among basically similar repairs. Repair or rework of a component may be simple and straightforward on one occasion and complex and time-consuming on the next (as when internal parts are found corroded and seized upon disassembly). It is difficult, in many cases to speak of a "typical repair".

The problem of establishing the nature of repair tasks on the helicopter also appeared in the course of the field surveys which took place later in the program. A typical case would involve a high incidence of reported repairs on a component (based on examination of field data), but no authority for repair of that component in the Maintenance Allocation Chart for the helicopter. When asked, Army maintenance personnel would agree that no repair of the component was authorized. The reported cases of repair were usually attributed to faulty data, e.g., replacement of a tail rotor pitch link recorded as "repair" of the tail

rotor installation. At times, field personnel would indicate that minor tasks were performed on the component (tightening a loose fitting, touching up surface corrosion, etc.), but these were not considered in the nature of a "repair" as such. Overall, the consensus was that the majority of corrective actions on the aircraft involved replacement of components or parts.

For these reasons, the maintenance task time analysis was concentrated on removal and replacement actions. These actions, for the most part, are relatively consistent from one occurrence to the next. Unusual difficulties may be encountered in any maintenance task, or course, but the basic steps are relatively the same in each instance. Therefore, the elements of time in removal or replacement of a component may be considered fairly standard, except for the element of fault isolation, which will vary with the type of failure which precipitated the replacement. If replacement was occapioned by excessive corrosion, for example, the fault was probably discovered via a routine visual examination and troubleshooting time was little or none. If, on the other hand, replacement was the result of tracking down an aircraft vibration to a malfunction in that component, troubleshooting time might be a considerable part of the overall task.

The approach, therefore, was to analyze the basic removal or replacement task (no-defect) and then to allocate time to fault isolation for specific kinds of malfunctions (or groups of similar malfunctions). The fault isolation times were later averaged.

For each of the selected components, a technical analysis of the replacement task was made. This involved researching technical manuals, maintenance handbooks, trouble-shooting charts, etc., to establish the component's function in the system and its packaging and location in the installation.

Maintenance task steps were then identified and constructed for the removal and installation of the component. These maintenance task steps, sequentially listed in order of their occurrence, identified the major work effort associated with no-defect replacements of the component. The maintenance time required to accomplish each step was then analytically developed and recorded. The analysis relied heavily on the judgement of experienced maintainability engineers supplemented by actual hardware examinations and task observations where possible. Each step in

The maintenance action was then assigned to one of the eight task element categories listed below:

- 1. Fault isolation (troubleshooting).
- Gaining access and securing doors, panels, fairing, etc.
- Removal and replacement of other components for accessibility to the component in need of replacement.
- 4. Removal and replacement of buildup components.
- 5. Removal and replacement of the end assembly component.
- Draining and refilling of fluid supplies (oil, hydraulic fluid, etc.) and servicing or lubrication after repair or replacement.
- Adjustment, alignment, balancing, tracking, etc. after repair or replacement.
- Inspection during and after repair or replacement and final test.

Table IX contains a typical component replacement task time analysis - the UH-1 helicopter tail rotor assembly (an illustration of the installation is shown in Figure 30). The manminutes required for the removal and installation functions are shown assigned to one of the eight task element categories (slash indicates that minutes are split between two categories). The numbers in parentheses refer to figure numbers from the technical manual.

Component replacement task time analyses, thus developed for each of the six helicopter models, were tabulated for discussion and verification in the field survey interviews which followed.

HENOW REALISMENT AND STREET AND S	r.					
TAXA	Task Element	m	m r	n n	ស	ĸ
REPLACEN	Install Minutes					
TAIL ROPO)	Minutes	10	ν ν	း တ		ω
14,2 11	Removal Tasks	1. Disconnect pitch change link (1) from each tail rotor blade grip pitch horn by removing nut, bolt and washers.	 Remove crosshead (4) and shim (5) by removing two attaching bolts with nuts and washers. Cut lockwire on each end of boot. 	 Remove cotter pin, nut and washer from end of pitch change rod. Remove bearing set (6), retainar plate (7), and pitch change slider (8). Remove boot (9). 	4. Cut lockwire and remove hub retainer nut (10). Remove static stop (11) and shim (12).	5. Move tail rotor hub and blade assembly (13) outboard on splines of shaft, and remove split cone set (14). Remove tail rotor over end of gearbox shaft (15).

Installation Task Position tail roto (13) near end of s splines and slide h is started on secon Side hub inboard to Install shim (12) or stop (11) and hub re tighten. Lockwire nut and ins Install slider (8) o wire each end of boo (7) and bearings (6) rod (16), secure by Determine thickness pitch change rod bear	0.000	Remove Install	lon	t (1.4) in groove on shaft.	٠	Install static nut (10) and	2/4		of shim (5) required on 4/12 7/8
3. 3. 7.	THE CHAINS IN THE STATE OF THE	Installation Tasks	hub and blade assaft (15). P gn b on shaft il	Place split con: set Slide hub inboard to	Inspact cone set for	Install shim (12) on shaft. Install stop (11) and hub retaining nut (10) tighten.	Lockwire nut	. Install slider (8) on shaft (15). Safery wire each end of boot. Place retainer plate (7) and bearings (6) on end of pitch change rod (16), secure by washer and nut.	. Determire thickness of shim (5) required on pitch change rod bearings.

PORTORIORISTICAL	Thetalline	Remove Minutes	Installed	Task Element
Hara Calonysis of Manager		* * * * * * * * * * * * * * * * * * *	Arten et l'arten de la	AND PRODUCT OF THE PROPERTY OF
œ <u>.</u>	Fill crosshead carity with grease. Place shim and crosshead over bearings. Align parts, install bults with washers through crosshead, shim, retainer plats, and		12	ហ
<u>ه</u>	riange of sinder. Install pitch change links (1) in cross- head.		12	м
70.	Connect each pitch change link to blade pitch horn.		ហ	m
3.1.	Check tail rotor clearance, and controls for free movement.		14/1.2	1/8
1.2.	Lubricate tail rotor.		ഗ	y
<u>.</u>	Track tail rotor		30	7
AIP ROWK ALIGNMENTHE	межно де чение на дене и на дене и на дене на передения на дене на передения на дене на передения на дене на д	un iran dene ja an emekada erberisch inklikalisch anderen der erberige gebe	CALINE MAJAR MIN AN AND AN AND AND AND AND AND AND AND	OTHER PROPERTY TO SHARE THE PROPERTY OF THE PR

PIELD SURVEYS

Field surveys were conducted at five Army aviation maintenance activities operating and maintaining the six helicopter models under study. The schedule for these visits is shown in Table X.

The purpose of the field curvey was twofold. The first objective was to compare the analytical findings of the Kaman technical staff with the experience and judgment of Army maintenance opecialists in the field. The second objective was to gain a deeper insight into the maintenance requirements of the various aircraft, especially from a qualitative standpoint.

Each field visit involved interviews with Army maintenance specialists, examination of aircraft and, where possible, the observation of actual maintenance operations. Each survey was centexed around interviews in which experienced Army maintenance specialists in power plants, drives, rotors, etc., were asked to supply maintenance estimates based on personal experience. Two Kaman maintainability engineers participated in each survey which allowed the interviewing to be conducted along aircraft subsystem lines. The Contracting Officer's Technical Representative from AAMRDL arranged and attended each field visit, scheduling the interviews for overall working efficiency,

Pigures 11, 12 and 13 show the format of the field questionnaire forms used. The first form recorded general information about the survey, such as the unit visited, levels of maintenance covered, and persons interviewed. The forms shown in Figures 12 and 13 were used to record detailed information on the individual components. The interview technique required that the person being interviewed provide estimates with no prior knowledge of the analytical estimates developed by Kaman personnel. This was done to avoid any tendency to simply agree with Kaman's analysis.

The procedure for conducting the interview was generally as follows. The person being interviewed was first asked to give his opinion of the three most frequent causes for replacement of the component (TBO, leaks, internal failure, etc.). He was then asked to rank the three causes for removal in descending order by estimated frequency of occurrence. The maintenance level at which the action was

TABLE X. FIELD SUI	RVEY SCHEDULE	
Operating Unit	Helicopter Model	Dates
First Air Cavalry, 7th Squadron, Fort Knox. Kentucky	OH-58	October 24 thru 25 1972
First Air Cavalry Maintenance Battalion, Hunter AAF, Savannah, Georgia	UH-1 AH-1	November 14 thru 16 1972
178th Aviation Company, Fort Sill, Oklahoma	CH-47	January 9 thru 11, 1973
355th Aviation Company (HH), Fort Eustis, Virginia	CH-54	January 23 thru 24 1973
Army National Guard Unit Byrd Airport Richmond, Virginia	ОН-6	January 26, 1973

performed and the MOS of the maintenance personnel who normally performed the action were also requested. Next, the person interviewed was asked to estimate the crew size and average man-hours involved in the replacement action. It was explained that the estimate could vary for the three removal causes listed depending upon the condition of the item after failure, the amount of troubleshooting involved with different failure modes, etc. Lastly, it was requested that the three most time-consuming elements of each replacement task be identified. This was recorded via a ranking number entered in the blocks in the lower half of the form. (Originally, percentage of total estimates were requested, but this was found to be impractical.) Again, it was explained that the ranking could vary among the three replacement actions, depending upon the nature of the tasks involved.

After the first sheet was completed, the Kaman maintainability engineer would compare the responses received with his analysis of the maintenance action. Where significant variances were found, the engineer would first make certain that there was a mutual understanding of the overall task being evaluated and the interpretation of work allocated to the various maintenance time elements. In some cases, the maintenance action analysis was revie ed step-by-step to identify the areas in which significant disagreement in time estimates had occurred. Adjustments in either the Kaman analysis or the interview responses were citen sade at this point.

The second sheet of the interview form was usually completed at the aircraft. The person being interviewed would be asked to comment on factors he felt contributed most importantly to the maintenance time elements he had ranked earlier. This normally involved looking at the hardware in question as comments were being recorded. Particular emphasis was placed on gross differences in time estimates which had not been adequately reconciled in the earlier desk session.

The field surveys were a very important phase of the total study. They served to provide insights into maintenance problems not obtainable through an analysis of data alone. In some cases, the analysis of maintenance task time was modified substantially as a result of acquiring a better understanding of the maintenance function through these interviews.

FIELD SURVEY QUESTIONNAIRE

Helo	Model:	<u>UH-1</u>		Date: Oct.24-25, 1972
Main	t.Level:	Org. and	D.S.	Location: First Air
				Cavalry, Hunter AAF,
				Savannah, Georgia
PERS	ONS INTER	VIEWED:		
1.	Name and	Rank/MOS:	John Doe, Sp	pec 5
	Military	Unit: A-C	ompany, Aircra	aft Maint.Bat.
	Duty or F	unction:	Crew Chief	
	Maintenan	ce Experie	ence: UH-1 (2)	yrs.), AH-1 (2 yrs)
2.	Name and	Rank/MOS:	John Smith,	Spec 6
	Milit Ty	Unit: B-C	Company, Aircr	aft Maint.Bat.
	Duty or F	unction:	NCOIC, Prop	& Rotor Shop
			ence: UH-1 (4	yrs), AH-1 (2 yrs), yr), CH-34 (6 yrs)
			> Att. 41 / T	117, On 34 (0 118)
3.	Name and	Rank/MOS:		
		_		

Figure 11. Field Survey Questionnaire, General Data.

EVALUATION OF COMPONENT TASK TIME	4	Avg. Freq. Han Avg. Rank Level MOS Hours Crew	α)	Nicks, scratches		· Elements of Maintenance Time	Gain Install Remove/ Remove/ Remove/ Region Inspect Access Other Install Install Drain Align Inspect Fault And Compon-Buildup Compon-Tube Track And Isolate Secure ents Items ent Service Etc. Test	
EVALU	Component WUC	Reason for	1. Noisy	2. Nicks	3. Leakit	To be seen to be a	Action	

,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们是一个人,我们

Figure 12. Field Survey Questionnaire, Page 1.

EVALUATION	EVALUATION OF COMPONENT TASK TIME
Component WUC	NUC 2621C Nomenclature Mast Assembly Model Ull-1
n II	Short length of tubing is used to listen for excessive bearing noise while helo is running. Suggest that stethescope be included in mechanics tool broad facilitate this check.
np gr	When mast boot becomes torn, it is difficult to replace. Rotor must be removed. Suggest split-type boot. (H-34 has zippered mast dust cover).
period areas we mercup to make the period of	
e e	Scratches are difficult to measure depth. Noed better measurement device than dial indicator with flat plate and stylus. Many times
DX CD	checking scratch depth. Also suggest protective coating to better
SZERIJADI KATI I DA KATI KATI KATI KATI KATI KATI KATI KAT	

Figure 13. Field Survey Questionnaire, Page 2.

COMPONENT REPLACEMENT TASK DATA

FORMAT AND CONTENT

Component replacement time data developed from the analyses and field work previously described is presented in six tables by helicopter model as follows:

Table XI Component Replacement Data, OH-58 Helicopter
Table XII Component Replacement Data, OH-6 Helicopter
Table XIII Component Replacement Data, UH-1 Helicopter
Table XIV Component Replacement Data, AH-1 Helicopter
Table XV Component Replacement Data, CH-47 Helicopter
Table XVI Component Replacement Data, CH-47 Helicopter

Each table is organized sequentially by component code. The data presented for each component includes a quantitative breakdown of the replacement time elements and, where pertinent, a statement of the factors which were found to influence the time involved in certain tasks. A two-line presentation of the task time elements is used. The first line shows the average total man-hours required for replacement of the component and the apportionment of this time among the eight task elements. The percent contribution of each element to the total replacement task is shown on the second line. Where factors pertinent to one or more of the task elements are given, a third line lists the number of the footnote(s) which applies to that element. The footnotes for a component are grouped at the bottom of the table on the same page.

The component replacement time factors presented in this study are averages developed from examination of historical data, detailed task time analyses, and the judgment of skilled and experienced field maintenance personnel. The average time to accomplish component replacement considers direct maintenance functions only. It excludes other contributors to maintenance time such as administrative and supply delays, lost time, record keeping, etc. As such, the maintenance time averages may appear somewhat lower than published averages which reflect "start-to-finish" times. Originally, it was intended that the total maintenance time be considered in this analysis. Attempts to obtain reasonable time estimates

for indirect maintenance functions such as locating equipment, chasing parts, completing forms, etc., were not successful, however. It was found that the time expended in such functions varied widely from one aircraft maintenance operation to another. The average time required to obtain parts was reported to vary from a few minutes to upwards of an hour (in the case of a unit whose supply source was across the airfield several miles from the maintenance base). Similarly, estimates of time for obtaining work stands, a crane; external power source, etc., were found to vary greatly, depending upon the relative abundance or scarcity of such equipment at that activity. Any estimate of the "average" time involved in such tasks would be very subjective and serve only to make the total time for replacement appear more reasonable and in keeping with other published statistics. Such data would, moreover, contribute nothing to the basic objectives of the study. Por these reasons, replacement task time analysis was confined to the "wrench turning" aspects of the job.

Even in this area, however, some difficulty was encountered in arriving at average maintenance times. Occasionally, the engineering task time analysis of a component replacement function would develop an estimate of total man-hours which was at gross variance with the average man-hours generated from the field data (TAMMS or 3-M). When this occurred, one or both of two conclusions might be considered. Either the field data was erroneous and/or the engineering task time analysis was faulty. The first: step in resolving the conflict involved a thorough analysis of the field data using the detailed maintenance action reports shown in Figure 6. Very often, cases of improperly coded data could be substantiated, as when replacement of a helicopter main gearbox was reported to consume 1.5 man-hours. An error such as this might have occurred in preparation of the original maintenance report or in the translation of the data to machinereadable format. Most often, it represented a case of improper code selection (use of the gearbox code or part number to report replacement of an oil fitting for example). a sufficient number of erroneous reports could be identified in the data for a component, it was usually possible to resolve major differences between the computer-generated statistics and the engineering analysis. When this failed to resolve the conflict satisfactorily, the engineer would review his analysis to confirm that his detailed task time estimates were valid and complete. Adjustments were made as necessary at this point.

In the course of the field interviews, disagreement between the engineering analysis and the time estimates of field

personnel also occurred. These resulted frequently from conflicting inverpretations of the maintenance task being considered, especially in the classification of time among the eight task elements, and were usually resolved through discussion. Not infrequently, the discrepancy was the result of over-estimating or under-estimating the time for certain tasks in the engineering analysis. The opportunity to discuss maintenance tasks with experienced field personnel while examining the actual hardware installation was extremely valuable in this regard. Very often, problems indicated by an analysis of maintenance instructions and installation drawings were found to be much less severe when actually viewed and discussed. Likewise, some problems overlooked in the technical analysis were revealed in this manner. Replacement time estimates were frequently modified as a result of the field survey.

The component replacement time factors developed from this study are the best overall averages established by skilled analysts using the various sources of information available to this program. Maintenance time is, however, a variable quantity. It is influenced by the environment in which people work and by the maintenance resources available to them. It is influenced also by their skill, motivation and morale, by the quality and depth of supervision and by the policies of management. The concept of an "average maintenance time" must be viewed within this context. Higher or lower averages may prevail where the physical or psychological factors influencing maintenance performance move in either direction from the norm.

The emphasis in this study has been on the quantification of maintenance time in terms of discrete task elements. Establishing the time structure of major maintenance tasks isolates the elements of work which contribute most to the overall manhour expenditure. However, there are factors involved in the performance of maintenance tasks which time statistics alone do not reveal. One additional requirement of the Government's work statement for this project was to identify the more important of these. This has been done by way of the notes appended to the statistical data in each table.

In the course of this study, many facts and opinions were brought to the attention of the analysts doing the research, either through their own analysis or from the field personnel they interviewed. Often this data was totally or partially unrelated to the subject of the study. In other cases, the data was relevant but was found to be unique to problems at a particular facility or with a special group of aircraft.

Thus, it was necessary to carefully review the collected data and to selectively extract the more significant information for inclusion in this report. The footnotes which accompany each table are the result of this screening, the comments considered most important to the immediate goals of this study. There is obviously much more information of a qualitative nature available on the maintenance of components covered by this study. Much of this would be necessary to any in-depth study of maintenance problems flowing from this initial investigation.

Figures have been used to illustrate some of the more important comments. They are found grouped at the end of the table for each model helicopter. Appendix IV contains historical maintenance data for each of the components contained in this section.

TABLE XI. COMPONENT REPLACEMENT DATA, OH-53 HELICOPTER Component Code and Total Fault Access (Their Install Data) Lotal Fault Access (Their Install Data) Lotal Fault Access (Their Install Data) Lotal Lotal Lotal Equit Access (Their Install Data) Lotal Lotal Lotal Component Code and Man-Hr 2.5 0.5 0.2 0.3 2.3 1.6 0.1 0.1 0.1 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
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***************************************	ALTER BANKS MANAGEMENT TO SERVICE STATES	i Bernanda da d	· Property Commission of the C		Task Element		Task Ele	ment				
Compone	Companent Code and	Pue			Fault	Gain Access And	Remove/ Install Other Compon-	Removo/ Install Buildup	Remove/ Install Compon-	Ora in Lube	Addust 1110n 110k	Inspect
Nomenci	ature			Total	Isolote	•	ents	ceas	ent	Sorvice	·ttc.	1631
15112	Main Rotor Fin	otor	Man-Hr Porcent Note	7.4	0.8 10.8		3.1		24:3 (1)	2.2	13.5	0 e 25
15114	Hub Grip Reserveir	aro.	Man-Hr Percent Note	0.7	 				42.9 (2)	14.3		14.3
15211	Tail Rotor Rub	otor	Man-iir Percent Note	ب 4	0 e		3.7.4 (4)		2 4.6 2 4.6 2 4.6	0.4 40	0.8 14.8 (5)	n w O ii

resulting from Enflure to apply corrosion preventive compound when originally inserting this bolt, causes boit setting. When this occurs, a mallet and drift pin are required for releasing the bolt and removing the mult the bolt.

t T S (2) Over texquing of the bolt attaching reservoir, stat-3-seal, sight glass, and packings to main roter hub grips have caused cracked sight glasses, reservoir cases, and duformed saals. This results in oil leaking from reservoirs and requires replacement of component or damaged parts.

(3) Pressure vent cap on top of rollef plug partially covers the pluge wrenching flats and restricts application of wrench for plug removal and installation. (Figure 16)

(4) Replacement untails disconnecting, connecting, removing, installing, and accounting for numerour parts and associated hardware. In addition, thros specific torque values are required during the installation process. (Figure 17)

(5) Bonded Laminytes of shin are required to maintain electrones within specific tolerance. Dissessibly and reseasonably of the hardware is sometimes necessary to obtain propor shimming.

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				Task Element	emant		· Presidential des citations des la company de la company	i i inter sentant den sentant de	
Component Code and Ronenclature	Total	Fault Isolate	Gets Access Secure	Remove/ Install Other Compon- ents	Remove/ Install Bulldup Items	Remove/ Install Compon- ent	Urain Lube Service	Adjust Align Track Etc.	Inspect And Test
19215 Tail Rotor Man-Sir Blade Percent	7	6.0 6.0		2.0 65.5 (1)	3.0	11.4		1.3 29.9 (2)	6.5
22500 T63 Engine Man-Hr Percent Note	28.9	45 40	2.7	3.4	16.0 55.4 (3)	20.18	2.7	0.4 0.0	2.7
22561 Fuel Pump Man-Hr Percent Note	2.0	20.8 .6	7.0		6.4. 4.4	30.00			10.3
(1) Procedures require removal blades. (Figure 17)	l of the	tail	rotor hub	and	bladen na	a unit	in order	to raplace	ace
(2) On later model aircraft, rotor on the aircraft, (Figure	provisions are made to facilitate dynamic balencing 17)		ನಿರೆಕ್ ಕು	facilite	ste dyna	nic bale	inaing of	of the tall	4
(1) The buildup of replacement engines includes removal of Installation on the replacement engine. This engine teardown The high expenditure of maintenance time is attributed to the mounting position, routing of plumbing and location of associances to attached linkage and parts. (Figure 18)	nont engines includes remonders to the engine. This engine to transport a attributed plumbing and location of there (Figure 18)	as includes removal of This engine teardown a is attributed to the and location of associa (Figure 18)	des remendant la transfer de t	valof emardown to the respective	val of accementies from the cardown and buildup process fro the number of accessories associated fittings, and the	les from Idup pro faccess ings, en	com the old process is t secries inv and the res	old engine for to the time-consuming the threshold the transfer the transfer the transfer transfer transfer to the transfer trans	for nouming their d
(4) Awmovel of fittings from	from the removed pump for buildup of the	dwnd pan	for bu	flaup of	t the re	replacement	it pump i	pump is required.	rad.
(5) Two sizes of coupling nuts connect lines to the fuel pump, value.	e connect	t lines	to the	fuel pur		Esch size has a	10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	specific torque	ordne

	y-ign dines, fraction-fulfal teachtif is as developed april teaund	ndi fi hakirindansi sugari ilikerkaminin ka aqirtayalinda	E	TABLE XI	1	Continued	ت		ANGELER CONTRACTOR OF THE PROPERTY OF THE PROP		
hannotella la destrona manda de la destraca de la d	derend og de ger garrende kingende der kannen kingen de kopen Trope der der	AND ALT THE WASHINGTON TO STATE OF THE PARTY		THE PROPERTY AND ADDRESS OF THE PARTY OF THE		Task Clement	ement			A 0.0 C.S. S.	And the partners of the second
Component Co Romenclature	Component Code and Romenclature		Total	Fault Isolate	Gatn Access And Secure	Remove/ Install Other Compon- ents	Remove/ Install Buildup Items	Remove/ Install Compon-	Drein Lube Service	Adjuse Alten Track Etc.	Inspect And Test
225-02	Main Puel Control	Mun-Hr Percent Note	ð. 4	0 K 0 K	on uo		17:6	35.3	 	03) 46.	
22563	Governor	Man-Hr Porcent Mote	3.0	26.7	60.		13.3	40.0	J. C.		10,3
22566	Fuel Chack	Man-Hr Percent Note	и и	200 200	90			13.6	48. 68.€ 68.€		201
23872	Lube Filter	Man-lix Percent Note	٠ د	20.5	16.7			33.3 (3)	00 00		20.3
(T)	Removal of fitt	ings from	the old	assembly for bulldup of	for bu	Jo dapti	tor sto	1 acomen	the replacement ascembly is	ly to r	rednired.
(2) Cult t	(2) The uppermost cult to remove and replifulted access, also h	self-lo lace. Indere	attach spplica	cking nut, attaching the fuel control to the This attachment point, which is located in a the application of the required torque.	d the fart, whi		control to the la located in a d torque.	the goar	gearbox housing is difficongested area with	iing ia com with	di të i
are ap	(1) Three different are applied to mountin	t torque values are specified for installation of the governor. ng hardware, tube and port coupling nuts, and lavel linkage nut.	10s are tube a	apacitition and port	ad for couplin	installa g nuts,	tion of and lave	the gov		Thase torques	ordness
(P)	Cleaning consis	sts of scaking the check valve in denatured alcohol for a period of one bour	ng thm	check val	lve in	denature	d alcohe	ol for a	period	of one	bour.
(S) Defore	(5) A suction gun o before removal of the	or other devices is used to remove puddled oil from within the filter housing filter alement.	ios is snt.	used to	remove	puddled	oil from	n within	the fil	tar hou	oing

et proposyguenes som, 4 Mas get 1908 de	AS gab compañ un des artes personal de productiva de consecuente de la consecuente della consecuente d	ers, in Statistics of the state	-	TABLE >	XI - C	- Continued	sed	especial in experiment semical	men d same de james provinción e junto deste	Paramet Way i Huntindoon j 1888	A THE PERSON NAME OF PERSONS ASSESSED.
Cempor Co.	Canpor : Code and Ronor + atura		Total	Fault Esclate	Gain Access And Secure	Remove/ Install Other Compon- ents	Remove/ Install Bufldup Items	Remove/ Install Compan- ent	Drain Lube Sarvica	Adjust Align Track Etc.	Inspect And Test
22583	Ignitaten Load	Man-IIT Porcent	1.7	6 6 8 8	11.8			8,7			11.0
26111	Engline-to- Trans. Orle. Shaft	Man-IIX Percent Note	3.0	7.6	69.7			200			90.
16310	Main Transmission	Man-Ur Peraent Note	13.9	0.4 40	4 64 04	6.7 48.2 (3)		 	4.5		4. 09
(1) n)l of head!!	(1) The shaft is covered all of which is at acted to heads ore inaccessible and attributed in the process of	sovered by a two-piece sheet metal shroud and passes through a sheet metal pused to the forward fire wall via numerous phillips head acrews. Some earew is and require use of an offeet screwdriver. Screw heads are frequently see of removal. (Figure 19)	by a two-piece shather the forward fire require use of an removal. (Wigure	-piece sheet ard fire wal se of an off (Figure 19)	motel 1 vie n	nest metal shroud and wall via numerous pl offset screwdriver.	and pass philitp r. Serv	ea through the heads	pages through a sheet metal panel lilips head screws. Some screw Screw heads are frequently	set meta Sona ac Juently	1 panel
(2) accent plate prevar	(2) On those helicopters equipped with armor plating, the plating must be removed to provide access to the shalf, he had not note laboard and completely hidden from view. Also, the nute are in close proximity to the plating brackets thereby prevently hidden from view. Also, the nute are in close proximity to the plating brackets thereby preventing full swing of an open-and wrench or use of a socket wrench.	sopters equipped with armor plating, the plating must be removed to provide farifucts eacuring the plating is installed with the how mute inboard and cylaw. Also, the nute are in close proximity to the plating brackets thereby of an open-and wrench or use of a socket wrench.	ppad wit acuring the nut	th armor the plate is are in	plating	Installe proximi	lating m ad with ty to th wrench.	ust be r the hex e platir	ramovad t nuta Lab sg bracks	to provi	d com-
(3) rotori transii	(3) Due to the strangement (physical location) of components in the power delivery train to retors, main train and access to the main transmission, These include main totor blades, main rotor hub, ewashplate and support assembly and contrel rods.	rangement (p control, and ingluda mal	hymical rotor c n rotor	logetion somponent blades,	noin ro	mponenti be remo	n in the ved to p , swashp	powar (rovide (late and	Selivery Sceen to Selipport	train to the me	to the
(4) (4) (4)	Draining the transmission sump involves removal of a plug at the right forward bottom a transmission and allowing oil to run into a locally fashioned trough lending over the a sircust. Splitage is inevitable and much olesn-up time is required.	eransmitation nod allering lilage in in	oll to	rolves x run into	removal s a loca th clean	Liy fas	ug at th hionad t a ia raq	e right rough le	forward sading ov	bottom	corner

TABLE XI ~ Continued	Task Elenont	Cain Install Remove/ Remove/ Remove/ Adjust Inspect Compon- Hulbe Treck And Compon- Hulldup Compon- Lube Feylt And Compon- Hulbe Feylc. Test Test	Tail Rotor Man-Hr 0.6 0.2 66.7 66.7 Coupling Note 10.3 0.3 1.6 0.2 Hanger Porcent 10.7 1.6 0.2 90.4 (1.3)	(1) The laminated stand disc floatble couplings are relatively easy to replace and present only one maintenance problem. Changing the sequence of discs within the stack-up, or changing the sylantacion of any single disc, renders the coupling unusable, it appears that a simple indexing extens, with permanently applied marks, would allow re-stacking of discs in that exiginal oxder star, and of the same of the star of the star of the confidence of the shaft, from the forward end. Replacement of most aft bearings which all must be slipped onto bearings. (3) Each beauting has a self-aligning feature which requires a complicated bearing installation procedure. Intitally the bearing is applied to the bolt which causes the split housing and aligned by the seaffly in the stalled to the bolt which causes the shift housing to compress and appealed to the size of the solution of the size of the split is an applied to the bolt which causes the shift housing to compress and appealed to applied to the bolt. In monitored with heat crayen. If temperature remains normal, alignment is considered proper and appealed to applied to split housing bolt.
Manageri ed her grunden e ser general belegen et se ses ser general belegen et se ses ses ses ses ses ses ses s Se ses ses ses ses ses ses ses ses ses s		Component Rode and Homanclature	26411 Tail Rote Driva Coupling 26413 Hanger Bearing	(1) The laminaced one extended on any second with permanes of any second with permanes of a second of

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ACOMETAN REGULATIVE GORDEN II NEEGLANN WE	· · · · · · · · · · · · · · · · · · ·	Orete Lube Sorvice	- S		6.4 00 4	hub and	te vulne	
BRITH-HANCHALIBBEHNI B-6 DALING NG A		Amove/ Yustell Compon-	9.4 9.4 9.4	4 7 7 7 7 7 7	87 645 645	on, La	which being re	L) box
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Continued	744 67667	Remove Install Other Compon- ents	57.3			Moved of the reduction	# # 50 # 50 # 50 # 50 # 50 # 50 # 50 #	cing thi
	Mark des alle van des interferent alle meet fer. Per al Kromen en meet in person en in seemaal	Gets Andess Secure	04 46		00 0.5	krae ree Krae con	TOOSTS	elger &
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edis de l'entre de l'appende est présente de l'appende l'est de l'appende l'est de l'appende l'est de	A THE REAL PRINCIPLES AND THE PR	ode ánd R	Tail Notor Gearbox	orcop: Comparate	Oil Cooler	(1) Replacement of the safer of the tending of the tells	The turque tube from maintenance g bent and dieto r ether objects.	COOKER REPLANT
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						Task Element	cment			-	
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29711 A	Anti-Ice Control Actuatox	Man-Hr Percent Note	2.2	18.2	18.2		9.1	45.5		0.1	0.1
42111 \$	Starter Gunerator	Man-Hr Percent Pote	3.0	0,3	20.0	10.0		0.8 40.0 (2,3)	5.0		10.0
(1) si clearance are east	(1) Spacers are at clearance of control are easily dropped an	(1) Spacers are utilized to mount the actuator and its bracket to the engine mounting pad for clearance of control lever movement during removal and replacement of the actuator. These spaces are easily dropped and misplacid, and become loose hardware within the engine compartment.	int the it durin	actuator g remova	and it land r e hardw	and its bracket to the engine mounting pad for and replacement of the actuator. These spacors hardware within the engine compartment.	at to the	e engine ho actua hojine c	mountin tor, Th	ig pad f iese spa nt.	or
(2) Ti or until to the di	(2) The starter/go or until the clamp ha to the shaft when the	generator must be properly supported whenever the attaching clamp is loosened has been installed and properly torqued. Maintenance induced darage has occurbe unit is allowed to support its own weight.	be prop led and wed to	erly supproperly	ported y torque tts own	whenever ed. Mai weight.	the att	aching :	clamp is 1 dænage	ioosened has occurred	ad
(3) The and reconsisted	(3) The electrical and reconnected when selectrical tape while	(3) The electrical connection consists of five individual leads. and reconnected when replacing the component. In addition, each lessisectrical taps while disconnected.	onsists compone	***	indivic	ve individual leads. Each lead must be dis In addition, each lead must be protected by	72	Each lead must be disconnected must be plotected by	nust be . .otected	disconne by	scted

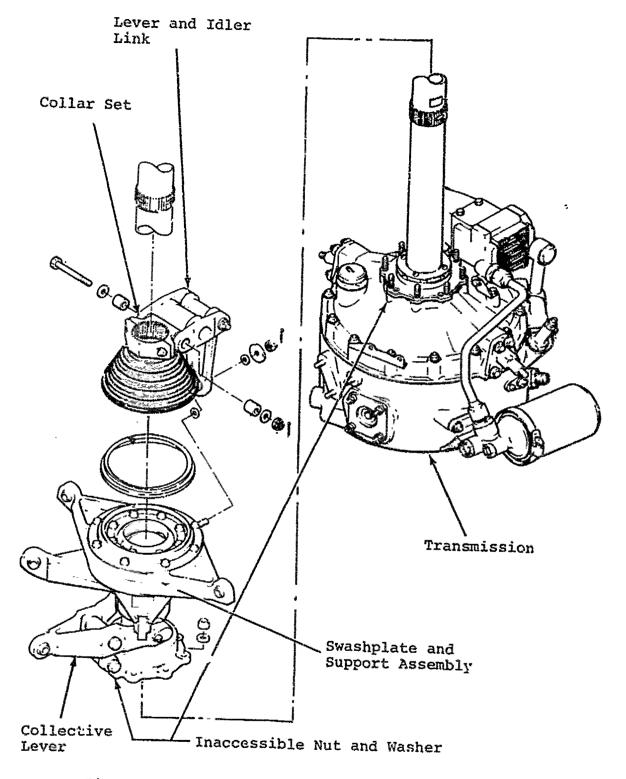


Figure 14. Swashplate and Transmission Assembly, OH-58 Helicopter.

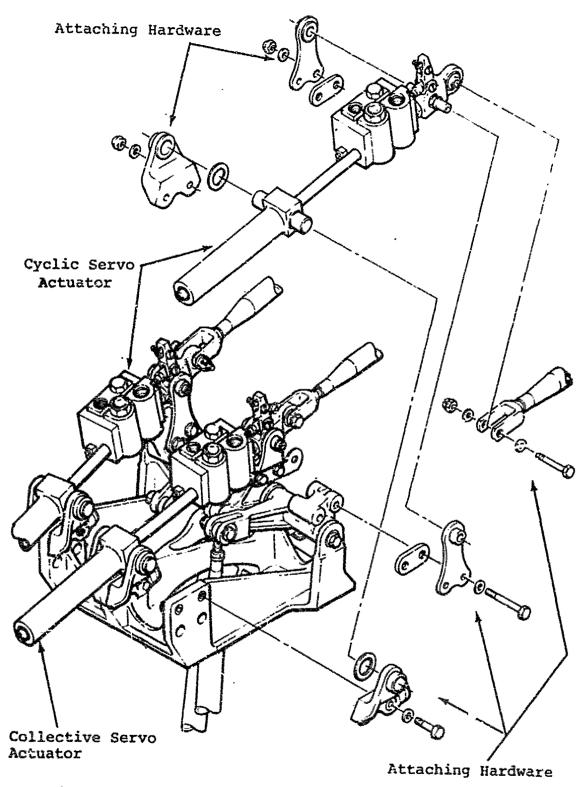
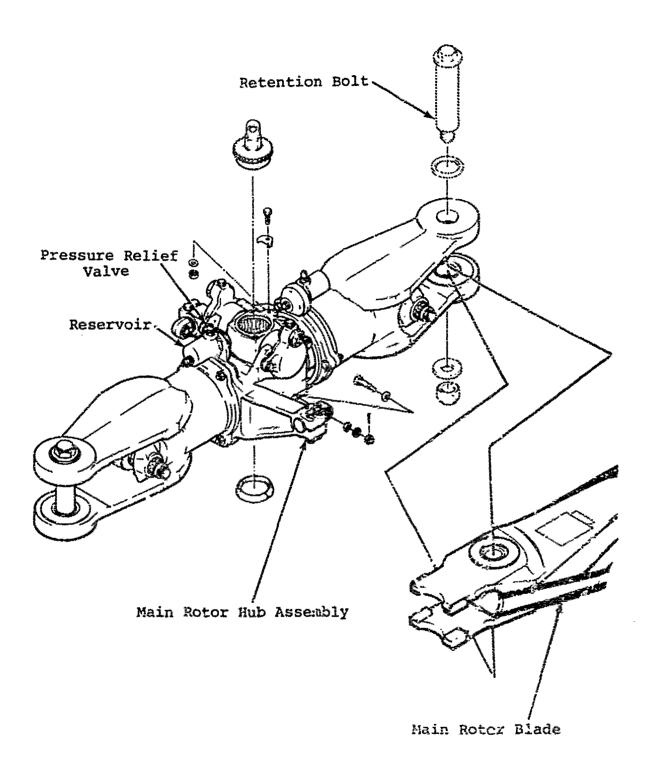


Figure 15. Cyclic and Collective Actuator Installation, OH-58 Helicopter.



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Figure 15. Main Rocor Hub and Blade Installation, OH-58 Felicopter.

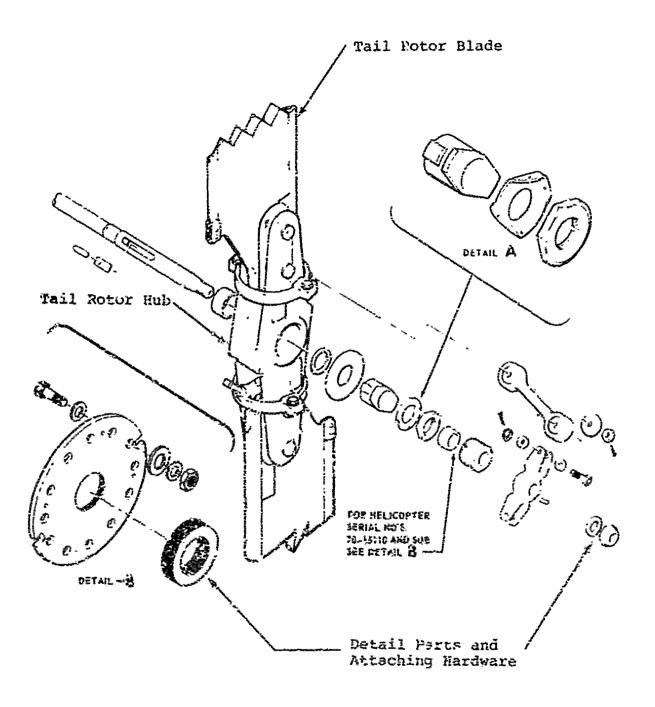


Figure 17. Tail Rotor Assembly, OH-58 Helicopter.

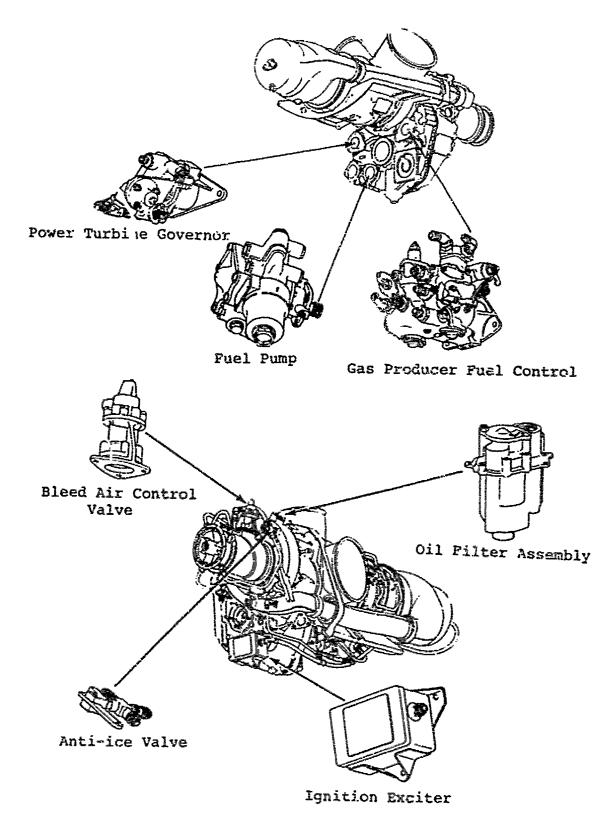


Figure 18. Engine Accessories, OH-58 Helicopter.

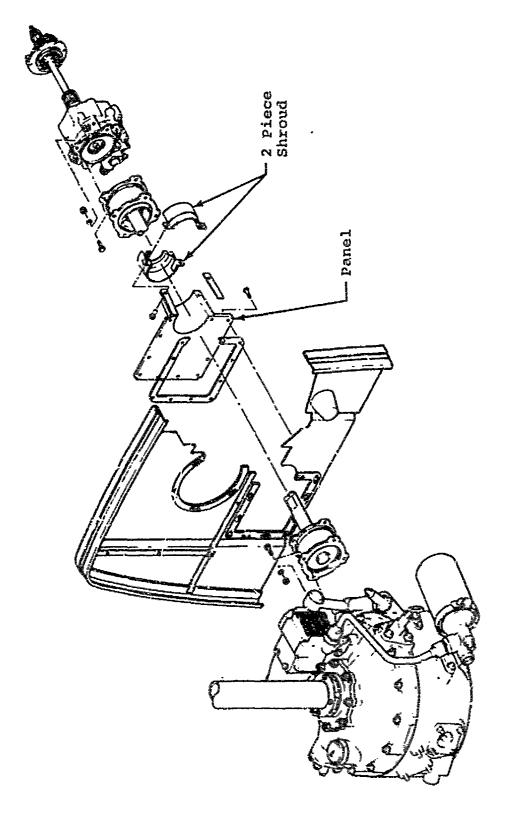
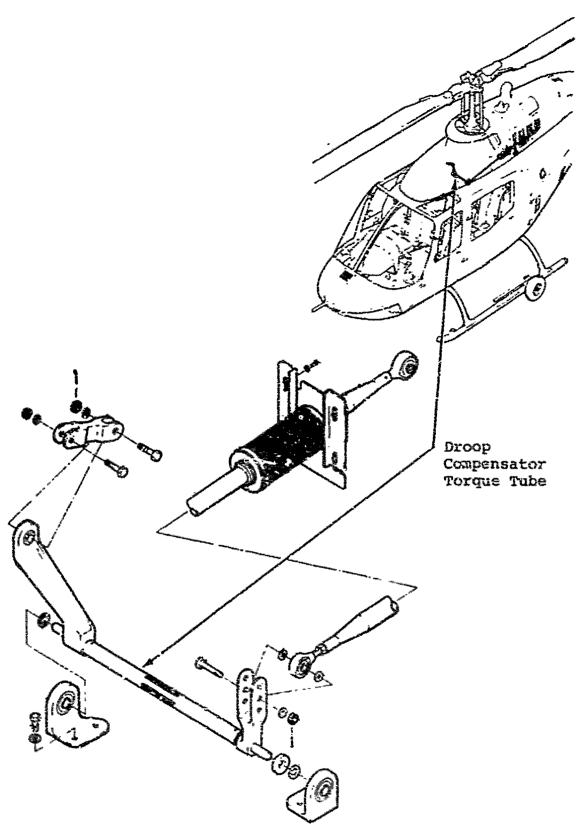


Figure 19. Drive Shaft Installation, OH-58 Helicopter.

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Figure 20. Druop Compensator Installation, OH-58 Helicoptor.

SUMMARY OF DESIGN FACTORS RELATED TO MAJOR COMPONENT REPLACEMENTS, OH-58 HELICOPTER

The more significant maintainability design characteristics of the OH-58 helicopter, within the ten major component areas covered by the study, are in summary:

1. Tail Rotor System

- a. The tail rotor drive shaft is supported by six hanger bearings, all of which must be slipped onto the drive shaft from the forward end. This arrangement requires removal of all bearings located forward of the defective bearing being replaced.
- b. Changing the sequence of discs within the stackup or changing the orientation of any single disc renders the laminated steel disc flexible couplings unusable.
- c. Replacement of the tail rotor hub entails disconnecting, removing, installing and accounting for numerous parts and associated hardware.

- d. Procedures require removal of the tail rotor hub and blades as a unit in order to replace blades.
- e. Each hanger bearing has a self-aligning feature which requires a complicated bearing installation procedure.
- f. Disassembly and reassembly of the hardware are sometimes necessary to obtain proper shimmi. of the tail rotor hub.

2. Main Rotor Hub

- a. Frequently the main rotor blade retention lt is difficult to remove.
- b. Overtorquing of bolts attaching reservoir, stat-oseal, sight glass, and packings to the main rotor hub grips has caused cracked sight glasses and reservoir cases and deformed seals.

Transmissions and Gearboxes

a. Due to physical location of components in the power delivery train to rotors, many drive, control, and

rotor components must be removed to provide access to the main ransmission.

- b. Replacement of the tail rotor gearbox requires removal of the tail rotor hub and blade assembly.
- c. Spillage of oil is inevitable and much cleanup time is required when draining the transmission sump.

Hydraulic Servo Actuators

Numerous pieces of attaching hardware are required for mounting the actuators.

Starter Generator

- a. Five electrical leads must be disconnected and reconnected when replacing the component.
- b. The starter-generator must be properly supported thenever the attaching clamp is loosened or until the clamp has been installed and properly torqued.

6. Stashplate and Supporting Assembly

The nature of the design and its inherent function and location require removal and installation of a number of other components for replacement of this assembly.

7. Main Drive Shafts

- a. On those helicopters equipped with armor plating, the plating must be removed to provide access to the engine-to-transmission drive shaft.
- b. Scraws attaching the metal shroud covering the drive shaft are inaccessible and frequently are stripped in the process of removal.

8. Power Plant Installation

- a. The buildup of replacement engines includes removal of accessories from the old engine for installation on the replacement engine. This engine teardown and buildup process is time-consuming.
- b. Accessories require removal of fittings from old assembly for buildup of the replacement assembly.

- c. Two sizes of coupling nuts connect lines to the fuel pump. Each size has a specific torque valve.
- d. The uppermost self-locking nut, attaching the fuel control to gearbox housing is difficult to remove and replace.
- e. Three different torque valves are specified for installation of the governor.
- f. Oil cooler replacement requires removing and replacing thirteen bolts and washers attaching the cooler to the duct extension.

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22062	Oil Cooler	Man-Hr Percent	5.1	5.9	15.7	29.4	1.5 1.8 0.4 29.4 35.3 7.8 (3.4)	35.3	7.8		
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(3) C requir	(3) Oil cooler replacement requires removal of the oil cooler duct. Access to attaching hardware requires removal of the right side troop seat, sound-proofing installation and oil cooler access door in the aft cabin compartment.	placement requir f the right side bin compartment.	res remo 3 troop	val of peat, s	the oil ound-pro	cooler ofing 1	duct. A notallat	ccess to	o attach oil coo	ing har ler acc	Searo Seo
the du	Inaccessible bolt duct at the oil co	bolts and nuts with separable spacers contribute to the difficulty of detaching 1 cooler interface.	with sof	arabla	spacors	contrib	ute to t	he diff	iculty o	f dota	1 ng
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))	Drive Shaff	raria Terrer Terrer	.	N ÷ O th	면 이 등	0 m	0 c	9.0		ر ب	7.
	enterminational description of the second control of the second co		2				•		•	, (S)	, ,
		will main trunsmission access door must be removed and rejuitallax	ransmissic	on access	GOOK II	ust be r	pevone	and roll		Section of Representation	-
(3)	The lower set of		tach bolt	7 63.5	- 4				* 5944555		

wer set of 3 shaft attach bolts are in closs proximity with surrounding sheet metal More classance is desirable to facilitate use of torque wrench on bolts. tructure.

(3) Shimming must be accomplished so that the main drive shaft fits between the clutch output [langs and the transmission input flange with no more than .020 inch compression nor any more than .010 inch gap. The shimming procedure is similar to the one used for the tail rotor drive shaft

(4) Shimming must be accomplished so that the tall rotor drive shaft fits between the transmission two flexible disphragm couplings. (Figure 25).

(S) The shimming procedure requires that the shaft and tail rotor gearbox be installed, gap measurements taken, shaft and gearbox removed, shims installed and, finally, the shaft and gearbox reinstalled.

VVOROTERIORI (Nemerical Control of Control o	enauganoussanonsanonska-mailimusen-katurateljunaritemini-samen-samenaritemini	enister despression de la company de la comp	ж.	TABLE X	X: 45 die C	continued	.ec	KINENGARINAN PARIS NA BARBANIA	ANN AND MAN AND THE STATE OF TH	TRUMPHONE AND REAL PROPERTY PROPERTY AND	
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Conpor	Component Code and Nomenclature		Total	Fault Isolate	Gain Access And Secure	Remove/ Install Other Compon- ents	Remove/ Install Buildup Items	Remove/ Install Compon- ent	Dra(n Lube Service	Adjust Align Track Etc.	Inspect And Test
26126	Bearing Seal- rail Rotor Gearbox	Man-Hr Percent Note		5.4 5.4	. C.	2.1 26.7 (1)	Andreas Transporter (State Control of Contro	16.2	6.0 6.4		3.5 13.5
P 8 4 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Oil Filter- Main Transmission	Man-Hr Percent Note	1.0	30.0	50°5 30°5 30°5		* <i>j</i>	30.3 (3)			10.01
42058	Starter Ganerator	Man-Kr Vercent Note	** **	28.0	00 40			47:75 (4)			25.0
(2)	Replacement of the rotor	the Eall rotor gearbox output seal installation, balance and track is	gearbo	x output and tra	ck is c	requires chackad.	removal	and rol	removal and reinstallation of		the
(2) S cabin	(2) Sound insulation and cabin coiling.	ind 2 accuss covers must be removed to expose	けなやさつ	must be	remove	d to exp	ಕಾರ ಕಾರ ಕಾರ	C11 ter	filter through the	2 2 2 2 3 3 4 4 4 5 4 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	
450	safety wiring is difficult because the anchor hole for the lock wire is through a boss on the side of the pump housing which is relatively inscessible. The lock wire must be started thro: anchor hole before the filter housing as screwed into the pump housing.	issionit so maing which the Ellter	dause t is rel	he ancho atively is sere	k hole insces ved int	for the albie.	lock wi The loc	ro is th K wire m ing.	hrough a boss on the must be started through	boss or terted	the
(4) Replan		includes disconnecting and be identified upon removal	n remov		sure pr	connecting individual leads to the starter generator. to ensure proper installation.	il leads	to the	されるれたるだ	generat	ż
	ен обезейна ублагу сёнь разрашена в организация постој. С т д от подоставлавалист	and personal requirements of the personal section of the Personal Section Sect		And the second s				-			on manufacture 1

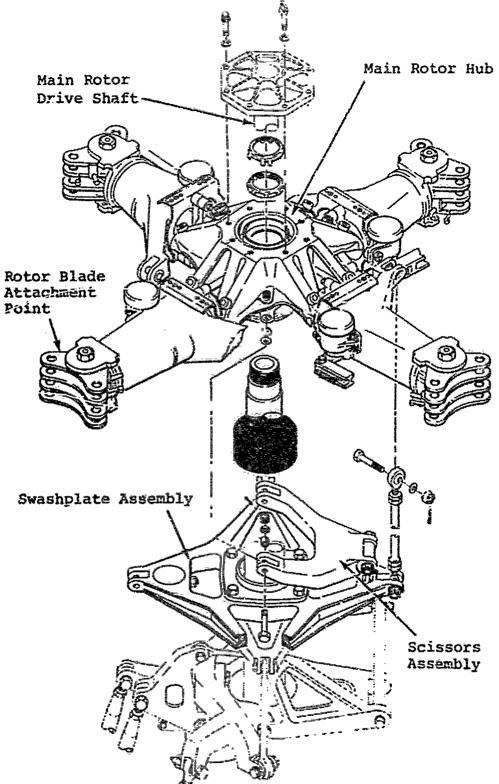


Figure 21. Main Rotor Hub and Swassplate Installation, OH-6 Helicopter.

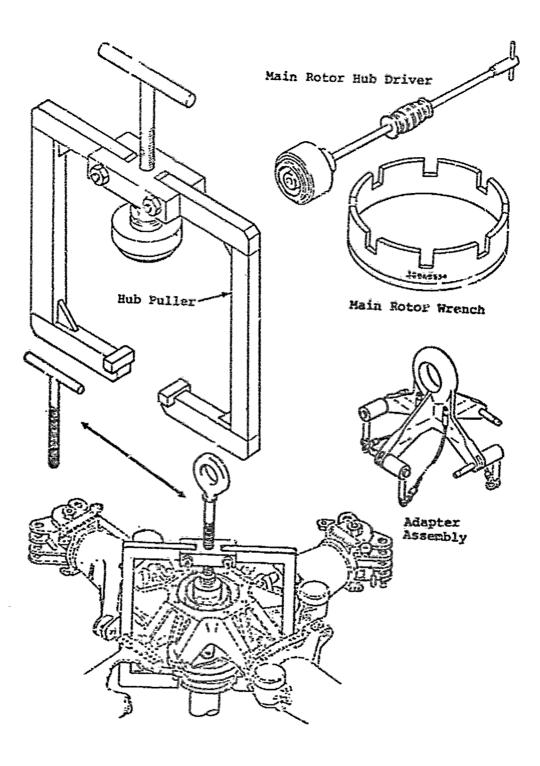


Figure 22. Special Tools for Main Rotor Hub Replacement, OH-6 Helicopter.

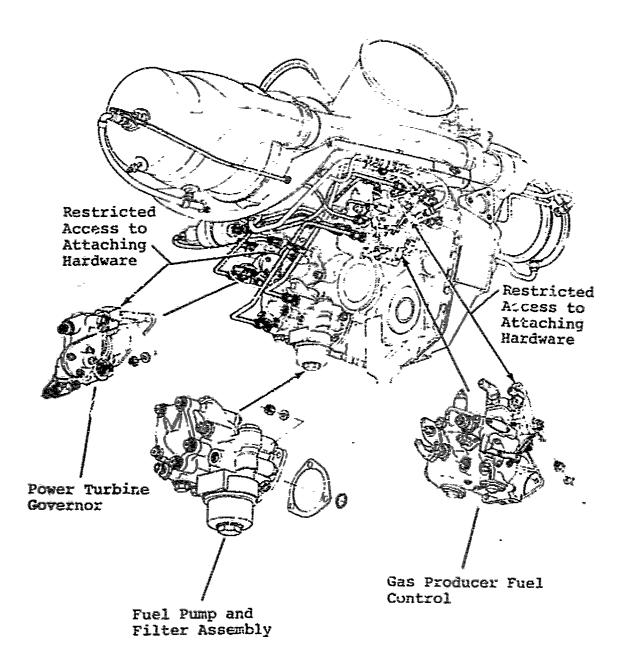


Figure 23. Engine Fuel System Components Installation, OH-6 Helicopter.

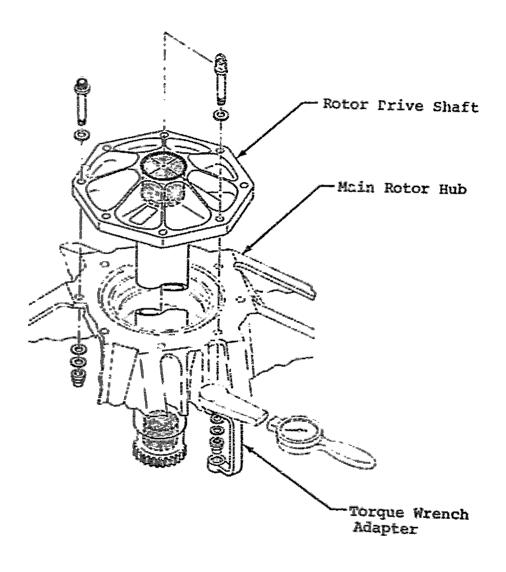


Figure 24. Rotor Drive Shaft-to-Hub Attachment, OH-6 Helicopter.

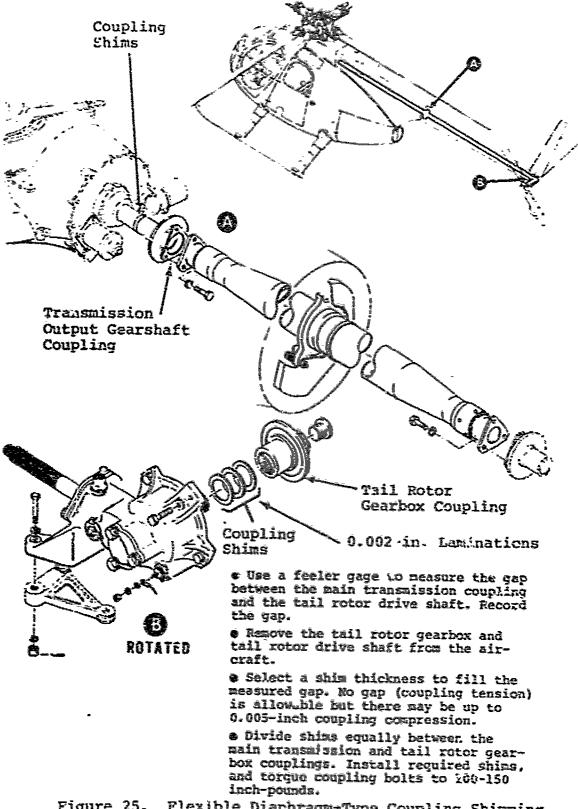


Figure 25. Flexible Diaphragm-Type Coupling Shimming, OH-6 Helicopter.

SUMMARY OF DESIGN FACTORS RELATED TO MAJOR COMPONENT REPLACEMENT, OH-6 HELICOPTER

The more significant maintainability design characteristics of the OH-6 helicopter, within the ten major component areas covered by the study, are in summary:

Tail Rotor System

- a. Replacement of the tail rotor hub assembly usually requires rigging the tail rotor control system. The rigging sequence is time-consuming the to the number of steps involved.
- b. Replacement of the tail rotor blade and hub requires three judgement measurements by Haintenance personnel.
- c. RepJacement of the tail rotor gearbox requires removal and reinstallation of the tail rotor. Upon reinstallation, balance and track must be checked.
- d. Shimming must be accomplished so that the tail rotor drive shaft fits between the transmission output coupling and the tail rotor gearbon input coupling. The shimming procedure requires that the shaft and tail rotor gearbox be installed, gap measurements taken, shaft and gearbox removed, shims installed and, finally, the shaft and gearbox reinstalled.

2. Main Rotor Hub

a. Replacement of the main rotor is b requires removal and installation of the main rotor blades and drive shaft. Disconnecting and connecting linkages on the scissors assembly and pitch change rods is also required. A large portion of the hub replacement time is attributed to these tasks.

- b. Hub replacement involves the use of a number of special tools.
- c. Two different bolts (NAS464P-14 or 369A1020) are used to attach the main rotor damper arm depending upon the configuration. When bolt 369A1020 is used, shimming is required to provide clearance between the bolt end and damper housing.

Transmissions and Gearboxes

- a. The tail rotor gearbox and tail rotor drive shaft must be disconnected and moved aft about a foot to allow removal of the transmission. Access to the forward tail rotor drive shaft coupling is limited.
- b. Sound insulation and two access covers must be removed to expose the main transmission oil filter.
- c. Safety wiring the main transmission oil filter is difficult.

4. Starter Generator

a. Replacement includes disconnecting and connecting electrical leads. These leads must be identified upon removal to insure proper installation.

Swashplate and Supporting Assembly

a. The design requires sequential removal and installation of a number of other components to effect replacement of the assembly.

6. Mair Drive Shaft

- a. Sound insulation and main transmission access doors must be removed and reinstalled for replacement of the drive shaft.
- b. The lower set of attachment bolts is in close proximity to surrounding sheet metal. More clearance is desirable to facilitate use of a torque wrench on the bolt.
- c. Shimming must be accomplished so that the main drive shaft fits between the clutch cutput flance and the transmission input flange with no more than .020 inch compression ~~r any more than .010 inch gap.

7. Power Plant Insullation

a. Little or no clearance exists between the engine input and output oil line fittings. The arrangement restricts adequate wrench bites and contributes to the difficulty of disconnecting and connecting the lines.

- Special mounting pads are required to attach the engine to the shop stand for buildup and teardown.
- c. Safrty wiring the lower engine mount is difficult due to limited working area.

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		Adjust Align Track Etc.	23.8	10.0	idler nve. Ti reasser	tal mainter components assembly, 27).	renoviaced by
OPTER		Drafn Lube Servíce		0 N	ective ive sle	the total maintenance These components blade assembly, Figure 27%.	necting Ly misp
HELIC		Remove/ Install Compon- ent	1.0 47.6 (1.)	440 440 440	cho coll collect isansemb	on of that are up and half. (Fi	ing, cor re, easi
REPLACEMENT DATA, UH-1 HELICOPTER	enent	Remove/ Install Buildup Items			tached to the collective idler that on the collective sleave.	de porti compone rotor h	replacement involves disconnecting, connecting, removing, parts which become loose hardware, easily misplaced by
r DATA	Task Element	Remove/ Install Cther Compon-		50.0 (2,3)	o tac t ' hea	y a larging other	lves di
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COMPONENT		Tota1		10.0	collective ing assembly sa many detai (Figura 26).		
XIII. COM	. And, it there exercises not have a second constitution of the co		Man-Hr Percunt Note	Mar-Hr Percent Note	consists of two collective lever halvong about a boaring assembly and thrust ssambly includes many detailed parts wimpet process. (Figure 26).	placing the swashplate and support assembly, a large portion of the tot noted to the task of removing and installing other components. These of stabilizer har with attaching control tubes, main rotor hub and blade har damper and adapters, and the scissors and sleeve assembly. (Figure	such that component unting for numerous el. (Rigure 27).
TABLE	rice - descriptions descriptions descriptions descriptions des la construction de la cons	Component Code and Romenclature	Collective Lever Assembly	Swashplate/ Support Assembly	(1) The assembly consists of two collective lever halve tached to the collective idler bracket and pivoting about a bearing assembly and thrust the collective sesumbly includes many detailed parts what must be disassembled and reassembled during the replacement process. (Figure 26).	effort is devoted to the task of removing and installing other components. consist of a stabilizer har with attaching control tubes, main rotor hub and stabilizer bar damper and adapters, and the ucissors and sleeve assembly.	is) the design is such that component installing and accounting for numerous maintenance personnel. (Figure 27).
		Component Co	14118	14120	(1) T bracke collec during	(2) When re effort 1s d consist 05:	the state of the s

Component Code and Nomenclature 14141 Flight Control Control Cyl/valvo 15115 Main Retor Hub Assembly 1511D Scissors/ Sleeve Assembly

(1) When installing a replacement cylinder, the new cylinder must be adjusted to the same length as the romoved cylinder. Occasionally, the removed cylinder is no longer available or is damaged such that the required measurement cannot be obtained. This necessitates rigging the flight control system, a time-consuming function.

(2) The system contains three cylinders (left cyclic, right cyclic and collective) which appear identical. Although they are not functionally interchargeable, without making certain adjustments, they can be physically interchanged. There have been occurrences of improper installation which necessitated removal and relocation of the cylinders into their correct position. (Rigure 28).

(3) Many different torque values must be applied when installing the hub and associated hardware, with critical torques witressed and/or verified by a technical inspector. Shimming is required to obtain proper clearance between the rotor blade and drag brace clevis. (Figure 29).

(4) When replacing the aciasors and sleeve assembly, a large segment of the total maintenance effort is devoted to removing and installing other components. These components concist of: stabilizar bar, main rotor, and stabilizar with adapters. (Figure 27).

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			AND THE PROPERTY AND TH		Goin	Remove/ Install	Remove/ Install	Remove/	Dra (n	Adjust	28000Ct
Component Co Komenclature	Component Code and Momenclature		Total	Fault Isolate	And	Compon- ents	Buildup	Compon-	Lube Service	Track Etc.	And Test
15118	Main Rotor Counterweight	Man-Hr Percent	1.4	0.5				42.9			21.4
15217	rail Rotor Nub Assembly	Man-Hr Percent Note	ស ម	00 60		1.0 28.6 (1)		22.0	20	0.8 22.9 (2)	14.3
15212	rail Rotor Blade Assembly	Man-Hr Porcent	3.7	80.3 1.1		16.6 2.2		4.	2.1	0.8 21.6	2.67
22200	T-53 Engino	Man-Ilr Purcont Note	4 (d (4	7.0	3.6	010 010	24.0 56.9 (3)	2.02 7.02 1.03		4.7	4.70
(1) Tr	(1) The tail rotor hub and blade the handling of which contributes	hub and blade h contributes	i instal	installation contains many significantly to the total	ontains to the		small parts maintenance	ts and t	10	ns of hardwai (Figuro 30).	ย้
(2) Du to meas teardor	(2) During installat to measure the gap be teardown, and final bu	lon of the tween the ildup is	tail rotor hub retainer plate time-consuming.	or hub, plate an uming.	the crosshead d crosshead (Figure 30).	sshead head for	d is temporar. for shimming.	rarily e ng. The	y assembled. The process	i in ord s of bus	order bulldup
(3) Yereplact	(3) Yeardown and buildup of engine accessorios represent replacement task. Many steps, involving disassembly and are involved in the engine buildup process. (Figures 31	i)dup of engine acceusories represents the largest single elemint of the any steps, involving disassembly and reassembly of items in presertions sengine buildup process. (Figures 31 and 32).	ine acce wolving ip proce	disasses disasses	represe mbly an	nts the d reass l and 3:	largost embly of	single items i	single elom it of the itoms in projection seguence,	of the cibed se	duenco,

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	NATIONAL PROPERTY AND	inspect And Tert	6.4	4.0	12.0	00 41
		Adjust Alfgn Track	10.3			
The latest terminal and the second se		Orain Lube Service	3.0	00 6.1		11.4
		Remove/ Install Compon-	3.3 42.3 (1)	3.3 60.0 (2)	12 13 10	61.4
3d	ement	Remove/ Install Bulldup	0.3			
TABLE XIII - Continued	Task Element	Remove/ install Other Compon- ents	1.4			
	the terminated from the terminated from	Gadn Arcass And Secure	2.6	0.0 2.4	120	11.4
LE XII		Tac Solution	1.0	14.5	00 00 00	ია ია
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Marine des des des des des des des des des de			Man-lir Percent Note	Man-Hr Percent Note	Man-Ilt Fercent	Man-lir Porcent Note
Resident and supplied a distribution of the designation of the designa		Code and iro	Fust Regulator	Manifold Manifold	Starting Fuel Solenoid Valve	2226310 Starting Fuel Nozzle
SHERI HIS ON THE STATE OF THE S		Component Code and Romenclaturo	22.25.1	2222	22263	2226310

(1) Roplacement involves disconnecting and connecting a number of fuel and air lines, electrical cablos and mechanical linkage. Sequential stops must be followed to properly locate line runs and make the proper connections.

(2) The main fuel manifold is bracketed to the starting fuel manifold and mounted at the year of the engine combustion chamber housing. Replacement tasks in lower sections of the manifold, adjacent to the fire-wall structure, are hindered because of the congested area and limited space available for tool application.

(3) Two engine starting fuel norzels are located at the 4 and 8 o'clork positions in the rear of the combustion chamber housing. The adjacent fire-wall structure limits the available working area for on-aircraft component replacement.

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~					5	Remove/			AND THE PROPERTY OF THE PROPER	ANTINETIME TREATMENT SECTION IN THE	менциналительная какентирования в
Compone: Komenc)	Component Code and Nomenclature		Total	Fault Isolate	And	Compon-	Install Buildup	Install Compon-	Drain Lube	Adjust Align Track	Inspect
•	Company of the control of the contro	of territories in the second of the second of				23.12			Service	Etc.	Test
22291	22291 Excitor Unit	Man-lir Porcent	а. Н	26.5	20.0			0,5 0,4			0.2
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		Note of the		27.8	16.7			38.9			7.9
26111	Main Drivo Shaft	Man-Hr Percent Note	ស ម	0.0 0.0	 	00 6.0		20.0	1.1 31.4 (2)		0.8 22.9
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(1) The engine confilms four ignites plugs installed in receptacies in the aft end of the combustion chamber at 2, 4, 8, and 10 o'clock positions. The plugs located at the 4 and 8 o'clock positions are the most difficult to replace with the engine installed because of their proximity to the fire wall structure.

(2) The quantity of greess packed in couplings is critical. The packing procedure demands procision and is time-consuming. Replacement couplings are not prepacked. (Figure 33).

(3) Inspection requires disnazombly of shaft and complete removal of old grease. Solvents may not be used. Some maintenance companies use cotton-tipped sticks (9-rips) for this task. Each splins tooth is individually cleaned and vicually inspected for unacceptable wear patterns and/or deterioration.

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A STATE CONTRACTOR OF THE STATE	enament view to ename to ename to ename	e describer a company de manda management de management de management de management de management de management	TABLE	LE XII	1 1	- Continued	ed be	indicated by the statement of the statem	AL PART OF THE REAL PROPERTY OF THE PART O	ari ivineo grapano de sensitario de la sensitario della sensitario della s	
Component Co	Component Code and Homenslature		Total	Fault Isolate	Gain Access And Secure	Remove/ Install Other Compon- ents	Remove/ Install Buildup Items	Remove/ Install Compon- ent	Drain Lube Service	Adiust Align Track Etc.	Inspect And Test
26211	Nain Tranumisaton	Man-lir Percont Noto	31.4	3.2	2.4	8.1 25.8 (1)	12.7	10.1 32.2 (2)	0.8 2.5 (3)	2.4	2.6
2621C	мав с АвпотЫУ	Man-Hr Percent Note	10.3	0 4 ñ û	9.6	3.9		36.8	!		1.0 9.7 (5)
(1) r rotors main r	(1) Due to the arrangement (physical location) of components in the power delivery train to the rotors, many components must be removed to provide access to the transmission. These include main rotor hub, stabilizer bar assy., swauhplate and upport assy., control rods, and drive shafts.	gement (phys ts must bu r in rotor hub	ical lo emoved , stabi	cation) to provi	of comp de acce r assy.	onents sc to ti	in the post of the solution of the second	ower de? misskon d suppor	ivery to These it assy.	ory train to to These include ansy., control	tho 1
(2) throughous provided	(2) Accass to Ilnos, hoses, transmission mounts, lift link, drive shaft couplings, etc., is gained through access panels on both sides of pylon island structure and through a "hell hole" in lower fuselage under the pylon. Removal of panels is not difficult, but the resultant openings do not provide easy access to the listed components.	os, hoses, tran els en both sid pylon. Remova s to the listed	th sides of pylon Removal of panels	n mounts /lon isl. nels is	, lift and str not dif	link, d) ucture / ficult,	rive sha and thro but the	ft coupl ugh a "P resulte	lings, entrest and surface of the su	tc., 18 g b" in lo Irgs do	atned wer not
(3) 1 drain onvirc become	drain Transmission is drained very easily by opening drain valve and allewing oil to flow through drain line everboard under the helicopter. However, if the aircraft has been operated in a dusty controment, the residual film of oil in the drain line continues to collact dust until the line becomes completely blocked. Disassembly of lines and fittings is then necessary for cleaning.	is drained very easily by opening drain valve and allewing oil to flow through rd under the holicopter. However, if the aircraft has been operated in a dustresidual film of oil in the drain line continues to collact dust until the line blocked. Disassembly of lines and fittings is then necessary for cloaning.	nastly licopto oil in	by open c. Howe the dra of line	ing dra vor, if in lino e end f	in valvi the air conting	a and al coraft h les to c is then	lowing das been ollact on necessar	oti to for other other other one	low thro	ugh inaty ina

(4) Due to the location of the mest assembly in the power delivery train to the main rotor, its removal requires the prior removal of the main rotor blades, main rotor hub, stabilizer bar assy,, and chashlate and support assy,

(1) Occasionally, precautionary mast replacements are made for lack of a good method of checking depth of scratches. The maximum permisatible depth of repairable scratches is .010 inch.

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reference, 4've demonstrate		Remove/ Install Compon- ant	54.0 54.8 (X,2,3)	38.5	6.0 0.0	K G G L L L.	sitions mitting the roi	0 0 0
Д.	erent	Remove/ Install Buildup Items				127 ALIO	rily por eby per rted in d mount	amšas 101
~ Continued	Task Element	Remove/ Install Other Compon- ents	23.7			W. And I	tempore ace, ther be insa	to tran
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			Man-Ilr Porcent Note	Man-Hr Percent	Man-IIv Percent	ill raquires use of on case.	ton of the collexion.	o' entil requires application of hear to transmission case.
		Component Code and Nomenclature	Main Input Quill (Main Transmission)	Tubing-Main Transminsion	Hose-Main Transmission	Removal of quill ragu to transmission case.	(2) During installa son of the quill, a rubber plug is temporarily positioned in the relier input bearing to hold the reliene finance are which is part of quill asay. The rubber plug must be inserted in the relier searing from inside the transmission. This is accomplished through an unused mounting port on the left-hand wide of the transmission.	(3) Installation of
		Component Co Nomenclature	2621 E	26213	× 70 00 00 00 00 00 00 00 00 00 00 00 00	(1) Rethose	(2) Du Input brace wh Inside	(c)

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(3) Upon installation, a rigging check is required to verify operation of the governor RPM controls. The rigging procedure is very detailed and requires a high skill lovel.

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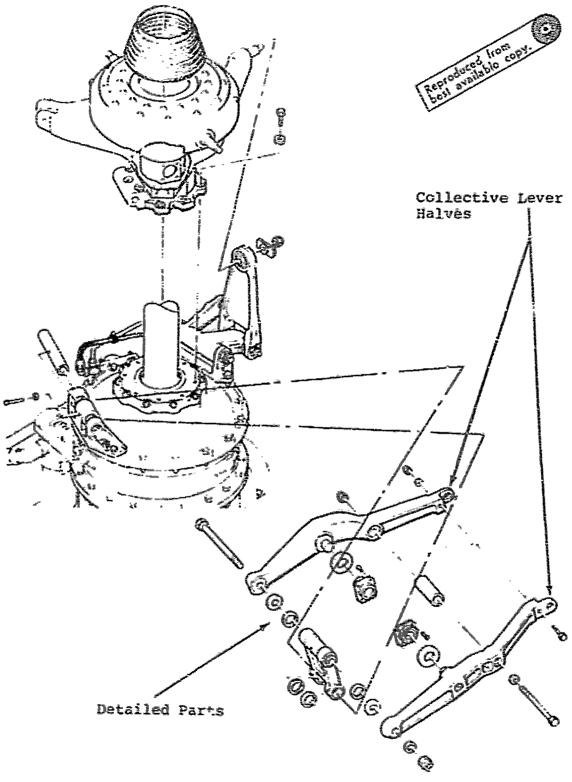
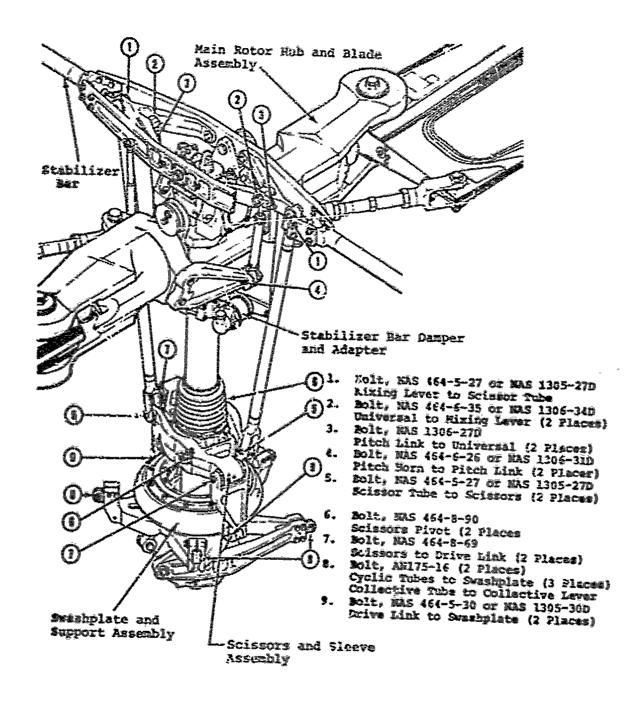
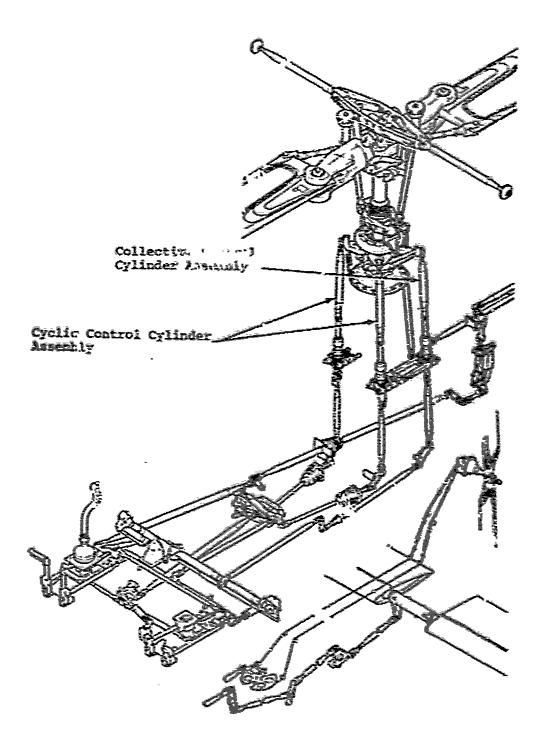


Figure 26. Collective Lever Assembly Installation, UH-1 Helicopter.



Pigure 27. Swashplate and Support Assembly Installation, UH-1 Helicopter.



Pigure 28. Plight Control System, UR-1 Relicopter.

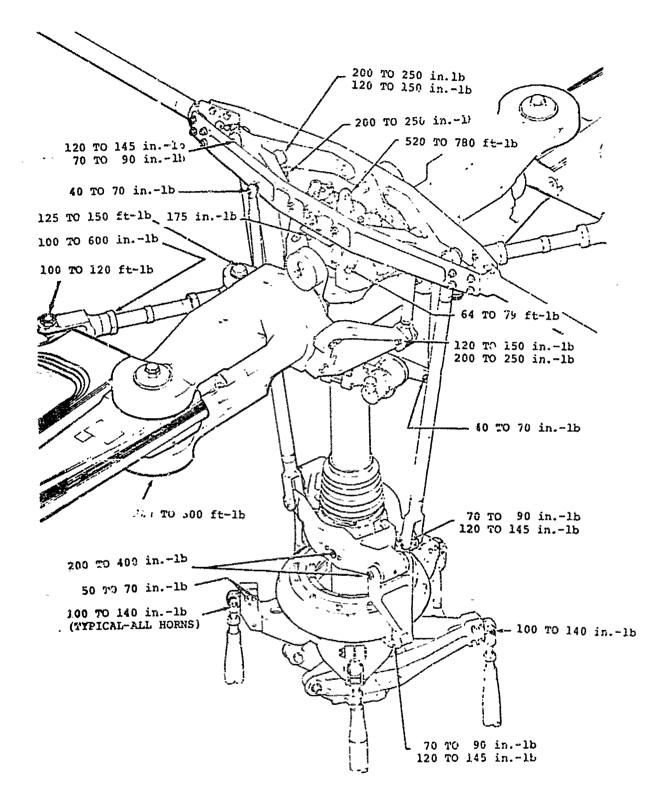


Figure 29. Rotor System Torque Values, UH-1 Helicopter.

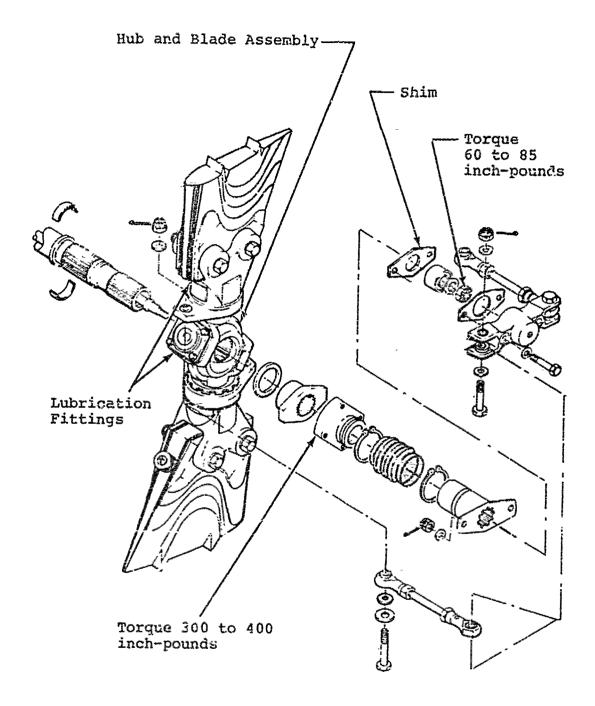
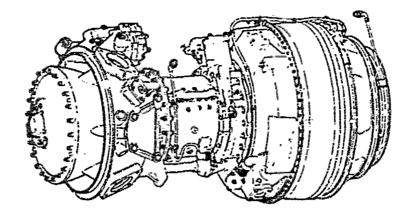


Figure 30. Tail Rotor Installation, UH-1 Helicopter.

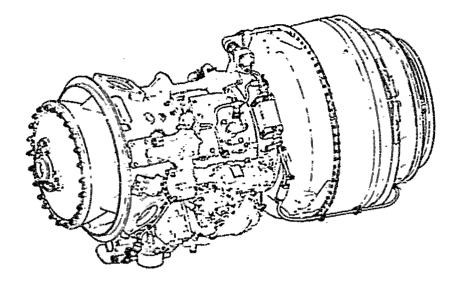


- (1) Remove retaining bolt, lockwasher, and output shaft adapter.
- (2) Remove starter-generator, cable, starter-generator fan assembly, and seal drain hose as follows:
- (a) Remove cooling ducts from aft end of startergenerator and at starter-generator shrould assembly.
- (b) Loosen hose clamps at each side of starter-generator fam assembly, and remove hose sections from fan. Remove clamp om inlet housing, and remove long hose from engine.

- (c) Remove starter-generator fan assembly and cable. Remove seal drain hose and fitting at underside of drive pad, and install plug. Install drive pad cover.
- (3) Remove main electrical cable by disconnecting leads from harness and units on engine and from exhaust thermocouple connector on rear fire-wall, and by detaching mable support clamps and brackets.
- (4) Remove linear actuator, governor control shaft lever, and droop compensator cambox and bracket assembly. Remove power lever control arm.
- (5) Remove tachometer generators from drive pads on overspeed governor drive box and on right rear of accessory drive gearbox. Install drive pad covers.
 - (6) Remove fuel control inlet hose, and cap fitting.
- (7) Disconnect two differential pressure switch hoses from restrictor fittings on fuel control. Replace fittings with plugs.
- (8) Disconnect hoses from combustion chamber drain valve and from drain tee on fuel control drive pad.
- (9) Remove governor seal drain tube and fitting and drain tee.
- Figure 31. Engine Teardown Procedures, UH-1 Helicopter. (Sheet 1)

- (10) Remove fuel control vent hose and fittings from _nboard side of governor.
 - (11) Plug open ports, and cap lines.
- (12) Detach support clamps and brackets of fuel differential pressure switch hose and oil pressure hose from left side of engine inlet housing.
- (13) Remové oil pressure transmitters, pressure switch, brackets, and hoses.
 - (14) Disconnect pressure hose from oil filter.
- (15) Disconnect torquemeter pressure transmitter hoses from left side of inlet housing and left front of accessory drive yearbox.
 - (16) Replace fittings with plugs.
- (17) Remove oil pressure switch and transmitters from support, and remove support assembly from top of inlet housing.
- (18) Remove oil pump inlet and outlat hoses and engine breather hose. Replace fittings with plugs.
- (19) Remove bleed air hose and allow from port at top of centrifugal compressor housing. Remove hose support clarge and bracket from engine. Install cover and gasket on stude at bleed port.
- (20) Remove exhaust tailpips with V-band coupling.
 Remove cover plate and attaching screws with center of exhaust
- (21) Disconnect exhaust thermocouple cable from connector om rear fire-wall.
- (22) Remove upper rear fire-wall assembly by releasing Y-band clamp around support cone flange and working adapter ring carefully aft over thermocouple tubing.
 - (23) Remove engine mount trunnions.

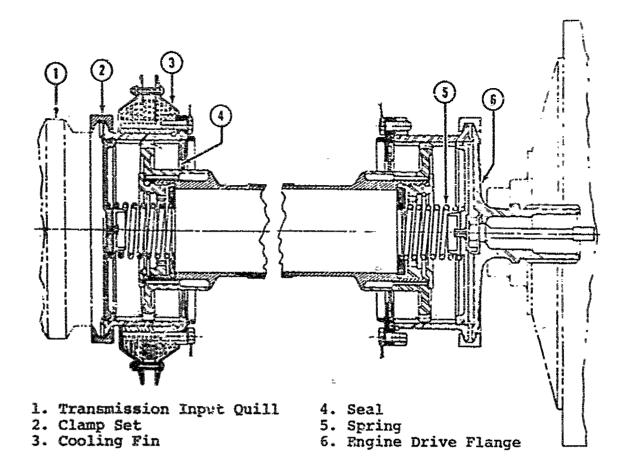
Figure 31. Engine Teardown Procedures, UH-1 Helicopter. (Sheet 2)

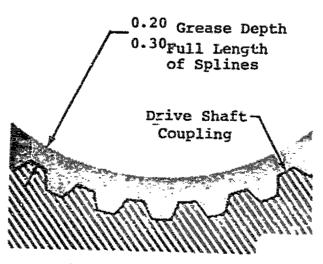


- Install engine mount trunnions, with any support brackets or clips normally attached on same bolts.
- (2) Install oil system hoses, including breather hose, with fittings and support brackets or clips, oil pressure transmitters, and switch support assembly, complete with connecting hoses.
- (3) Install two tachemeter generators on mounting pads, one at rear side of overspeed governor drive gearbox and one at hight rear side of accessory drive gearbox.
- (4) Install droop compensator cambox, linear actuator, and governor control lever. Install power lever exatrol arm on fuel control.
- (5) Install fuel control inlet hose, fuel control seal drain and combustion chamber drain hoses, and fuel control vent hose with fittings.
- (6) Remove plugs or fittings from pressure taps on fuel control pump housing. Install two restrictor fittings, and connect hoses to fuel differential pressure switch. Fuel differential pressure transmitter assembly is located on top of engine inlet housing.
- (7) Install upper rear fire-wall assembly, securing maken ring on flange of exhaust diffuser support cone with V-band coupling. Seat coupling securely and tighten clamp bolts to a torque of 40 to 50 inch-pounds.
- Figure 32. Engine Build-up Procedures, UH-1 Helicopter. (Sheet 1)

- (0) Connect thermocouple lead to connector on right rear side of fire-wall.
- (9) Install come parts on center of exhaust diffuser. Install exhaust tail Name Wash V-band coupling. (Refer TH 55-1520-216-20).
 - (10) Install main electrical cable with support clips.
- (11) Connect to engine electrical harness and to units sounted on engine. $\label{eq:connect}$
- (12) Install starter-generator and starter-generator cooling fan assembly.
- (13) Remove plug at bottom of drive ped and install seal drain fitting and hose. Connect cable.
- (14) Install output drive shaft adapter, with lock-wacher and retaining bolts. (Refer to TM 55-1520-210-20).
- (15) Check over engine and recove any remaining shipping covers or plastic plugs.

Figure 32. Engine Build-up Procedures, UH-1 Helicopter (Sheet 2)





Lubrication of Male Coupling

Apply a thin layer of grease on inboard surface of male (inner) coupling. Mate parts and move outer coupling to full outward position, with coupling bottomed.

Coat splines of female coupling with grease. Use a spatula to work out all air pockets from grease. Continue using grease until a wall 0.20 to 0.30 inch above top of splines has been built up.

Figure 33. Spline-Type Flexible Drive Coupling, Typical Lube Requirements, UH-1 Helicopter.

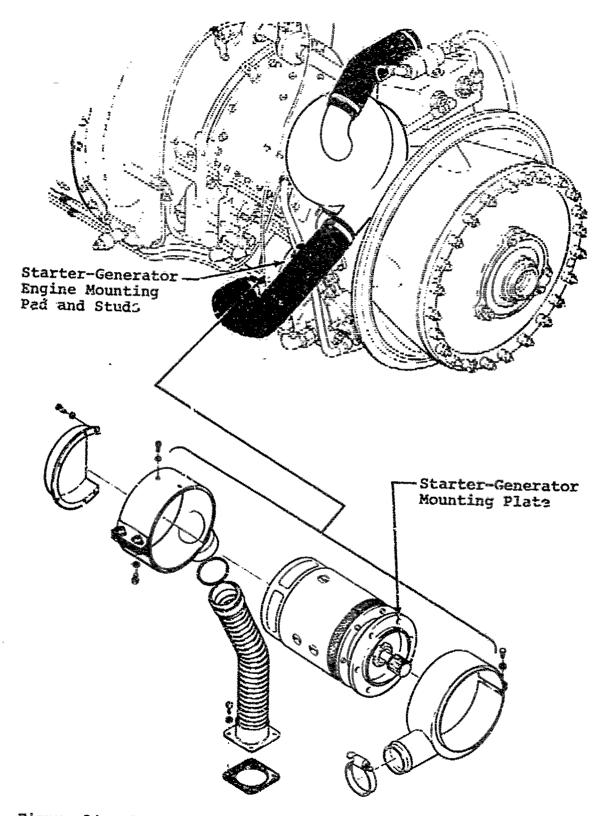


Figure 34. Starter-Generator Installation, UH-1 Helicopter.

SUMMARY OF DESIGN FACTORS RELATED TO MAJOR COMPONENT REPLACEMENT, UH-1 HELICOPTER

The more significant maintainability design characteristics of the UH-1 helicopter, within the ten major component areas covered by the study, are in summary:

1. Tail Rotor System

- a. The tail rotor hub and blade installation contains many small parts and items of hardware, the handling of which contributes significantly to the total maintenance time.
- b. During installation of the tail rotor hub, the crosshead is temporarily assembled in order to measure the gap between the retainer plate and crosshead for shimming. The process of buildup, teardown and final buildup is time-consuming.
- c. Clamps which retain the tail rotor drive shaft to mating couplings are supplied in matched halves. When installed, a gap will exist between the halves at the two attachment bolt locations. These gaps must be equal within .030 inch.
- d. Adjacent tail rotor drive shafts must be removed to permit replacement of the hanger assembly.
- e. Two tail rotor drive shafts must be dicconnected from the intermediate gearbox couplings to permit removal of the gearbox.
- f. Replacement of tail rotor gearbox requires removal and reinstallation of the tail rotor assembly. Upon reinstallation, balance and track must be checked.

2. Main Rotor Hub

Many different torque valves must be applied when installing the hub and associated hardware, with critical torques witnessed and/or verified by a technical inspector. Shimming is required to obtain proper clearance between the rotor blade and drag brace clevis.

Transmissions and Gearboxes

a. Due to the arrangement of components in the power delivery train to the rotors, many components must be removed to provide access to the transmission.

- b. Access to lines, hoses, transmission mounts, left link, drive shaft couplings, etc., is gained through access panel on both sides of pylon island structure and through a "hell hole" in lower fuselage under the pylon. Removal of panels is not difficult, but the resultant openings do not provide easy access to the listed components.
- c. Replacement of tail rotor gearbox requires removal and reinstallation of tail rotor assembly. Upon reinstallation, balance and track must be checked.

d. Removal of the main transmission input quill requires use of special jack screws and may also require application of heat to transmission case.

4. Hydraulic Servo Actuators

a. The flight control system contains three cylinders which appear identical. Although they are not functionally interchangeable, without making certain adjustments, they can be physically interchanged.

Starter-Generator

- a. A number of different starter-generator installations are currently being used on UH-1 model helicopters. Familiarization of maintenance personnel is required for each of these installations in order to ensure proper removal and installation of the particular cooling duct and shroud assembly arrangement for that configuration.
- b. The mounting of the starter-generator consists of six nuts and washers which attach the unit to studs on the engine mounting pad. Removing and installing these nuts is difficult because of the limited working space available.

6. Swashplate and Support Assembly

- a. When replacing the swashplate and support assembly, a large portion of the total maintenance effort is devoted to the task of removing and installing other components.
- b. The design is such that component replacement involves disconnecting, connecting, removing.

installing and accounting for numerous parts which become loose hardware, easily misplaced by maintenance personnel.

c. The collective lever assembly includes many detailed parts which must be disassembled and reassembled during the replacement process.

7. Main Drive Shaft

- a. The quantity of grease packed in couplings is critical. The packing procedure demands precision and is timeconsuming. Replacement couplings are not prepacked.
- b. Inspection requires disassembly of shaft and complete removal of old grease. Solvents may not be used. Some maintenance companies use cotton tipped sticks (Q-Tips) for this task. Each spline tooth is individually cleaned and visually inspected for unacceptable wear patterns and/or deterioration.

8. Power Plant Installation

- a. Teardown and buildup of engine accessories represents the largest single element of the replacement task. Many steps, involving disassembly and reassembly of items in prescribed sequence, are involved in the engine buildup process.
- b. The main fuel manifold is bracketed to the starting fuel manifold and mounted at the rear of the engine combustion chamber housing. Replacement tasks are hindered because of the congested area and limited space available for tool application.
- c. Fire wall structure limits the available working area for on-aircraft replacement of the engine starting fuel nozzels located at the 4 and 8 o'clock positions.
- d. Replacing the linear actuator requires removing and connecting electrical leads to the actuator terminal block. Indexing wire ends or referencing wiring diagrams is necessary to insure proper installation.
- e. Upon installation of the linear actuator, a rigging check is required to verify operation of the governor RPM controls. The rigging procedure is very detailed and requires a high skill level.

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TABLE XIV.		pus	Collective tover Assy.	Cyclic Swah- plate/Support Assembly	dentity co.	Three different size bolts are used to attach the assembly, each having a different torgal.		Numerous torque values are specified for the installation.	and and	
Handa Halli Milli Handa		Component Code and Humanclatura	HE COTTO	Cyclic S plate/Suj Assembly	(1) The assembly about a bearing as	명 등 등 보 다	then replacing to a dovoted mente consisted drive link.	umeroc	Removing and consuming du rements.	
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7837	Tail Motor Hub Aggembly		Man. Hr Vordost Note	ю. О	8.7 0.0		NO.S	A THERM HAND THE WAS IN A PART OF THE WAS IN A PART	220	1	2.8 19.5	500
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	(1) The bail reter hub and blade tratableshow contribution many small perts and items of hardware. the removing and installing of which contributes algnisticantly to the total maintenance the for	tor hub Leaters	and bis	G tratage Photocol	kaalor oc kasbore			**************************************	18 and 1. 28 last ma	LOUIS OF LOT	recommendations.	
	(2) During installation of the tail rotor hub. The eroscheed is temporarily accembled in order to measure the cap betyeen the rotainer plats and erosched for which he made	25 25 25 25 25 25 25 25 25 25 25 25 25 2			2				\ \tag{2}	**************************************	5. 5.	

to measure and final buildup to determine shim thickness is time consuming. The process of buildup teardown, and final buildup to determine shim thickness is time consuming. (Figure 39).

(3) Rany replacement acelons are a result of sactors were of parts and components, particularly bearings. The probable cause of many failures is keproper system intellation and rigging.

THE ACTION OF THE PARTY OF THE

		Andreas descriptions of the control		TABL	TABLE XIV - Continued	- Cont	inued	The state of the s				
							Task Element	ment				
Component Cod Nomenclature	Component Code and Momenclature	ਕੂ		Total	F-ult.	Gain Access And Secure	Remove/ Install Other Compon- ents	Remove/ Instali Buildup Items	Remove/ Install Compon- ent	Drain Lube Service	Adjust Align Track Etc.	Inspect And Tast
22200	22200 T-53 Engine	gine	Man-Hr Porcent Hote	43.0	2.1	6.0		24.0 55.8 (1)	7		~	2.0
22261	Fuel Regulator	or	Man-Hr Porcent	0. 9	1.0	1.7	1.0 16.7		41.7	1.7	13.3	80.0
22277	Oil Hose	9	Man-Hr Percent	E. L	2.5.2 4.5.2	0.5			23.1	0.3		23.1
A, Joseph Control of Hills Statement of the Statement of	Accessive Accessive Minimum Minimum.	ecites? Minasi vienna yl sypeniasperskii.	Mitter material salesteric processes services (1900)									

(1) Teardown and buildup of the basic engine, which includes removing accessories from the old engine and installing thom on the new one, represents the largest element of the replacement function. Many steps involving disassembly and reassembly of the adapting parts in prescribed sequence are involved.

(2) The replacement regulres checking main drive shaft alignment and control linkage rigging. Servicing and ground functional checks are also regulred.

(3) Engine ignition leads are worn and chafed by a rubbing action on the engine cowl hinge bar/tube. Probable cause is improper adjustment of the door hinge assembly.

(4) Engine and transmission cowling is attached to hinges with a nut, bolt, and washer arrange-mont. Engine changes require removing the coviling which includes removing the attaching hardware. The removal of this hardware is time consuming; and once removed, it becomes loose hardware, presenting an FOD hazard.

to a team of a misson and policia develoring developed and a see that are not to be heard and a leader developed to

		TABLI	TABLE XIV - Continued	Cont	inued		Argentin i kalangah di Partuman dan menganan	eserritäristen sestationes		
					Task Element	ement	adio atti transcolure titi pic cili ist kathacolumice mass given	AND THE RESERVE AND THE SECOND PROPERTY OF TH	and a second second	
Component Code and Nomenclature		Total	Fault Isolate	Gain Access And Secure	Remove/ Install Other Compon- ents	Remove/ Install Buildup Items	Remove/ Install Compon- ent	Drain Lube Service	Adjust Align Track Etc.	Inspect And Test
26111 Main Drivo Shaft	Man-Hr Percent Note	J. 6	5.2 5.0	6.8 8.8	0.3		20.6	32.4		0.8 23.5 (2)
2621C Mast Assembly	Man-Hr Percent Note	6.3	0.0 6.0	7.9	34.0		3.7			0.8 9.6 (5)
(1) The quantity of grease packe precision and is time-consuming.	f grouse packed in couplings is critical. The packing procedure domands me-consuming. Replacement couplings are not prepacked. (Figure 33).	ed in cor Replace	uplings ement co	is crituplings	cal. T	he packi prepaci	ing proc	edure do igure 33	ımands	
(2) Inspection requires disassembly of shaft and complete removal of old grease. Solvents may not be used. Some maintenance companies used cotton tipped sticks (Q-Tips) for this task. Each spline tooth is individually cleaned and visually inspected for unacceptable wear patterns and/deterioration.	ilres disasses saintenance co vidually cles	mbly of companies and and	shaft an used co visually	d completon til	ste remo ped sti sted for	val of ccks (Q-7 unacce	old grea lips) fo table w	se. Sol r this t	lvents m cask. E cerns an	may Each and/or

(3) Due to the location of the mast assy. In the power delivery train to the main rotor, it's removal requires the prior removal of the main rotor blades, main rotor hub, and swashplate and support assy.

(4) A small dlameter roll pin is used to lock the collet clamping nut in the mast controls installation. The pin is difficult to remove/install and often the nut is damaged or the drift (tool) is broken. (Figure 35).

(5) Occasionally, precautionary mast replacements are made for lack of an adequate method for checking the depth of scratches. Maximum permissible depth of a repairable scratch is .010 inch.

	enter apropriet bis seminare ris	Inspect And Test	6.2			heat	nput se	
an designation of the September of the S	was not be the second of the s	Adjust Align Track Etc.	And a service of the			tion of	roller i nner rac ng from left-har	
	AND PROPERTY OF THE PROPERTY O	Drain Lube Service				special jack screws and may also require application of heat	in the for of far far far far far far far far far fa	
		Remove/ Install Compon- ent	4.0 62.5 (1,2,3)	45.4	57.1	rogutre	ittioned / insert he roll	. case.
77	ement	Remove/ Install Bufldup Items		-		ny also	rily pos emitting tod in t	amiasion
Continued	Task Element	Remove/ Install Other Compon- ents	0.9			#B and m	tempora sreby pe se inser	to tran
7 - C		Gath Access And Secure	0 6.6	36.4	28.6	וכא מכבפו	plug is raco, thi g must b	of heat
TABLE XIV -		Fault Isolate	0.v	18.2	14.3	octal ja	rubbor r outer sbor plu Lløhed t	lcation
TAT		Total	e	٠; ط	* H	in of up	Tutll, a set tho! The rul	es appl.
	A CONTRACT OF THE PROPERTY OF		Man-lir Porcent Note	Man-Hr Percent	Man-Ilt Porcont	roquiros use of	ntion of the quill, a rubber plug is temporarily positioned in the roller input rollors against their outer race, thereby permitting insertion of inner race lil assembly. The rubber plug must be inserted in the roller bearing from sion. This is accomplished through an unused mounting port on the left-hand saion.	quill requires application of heat to transmission case.
		Component Code and Momenclature	Main Input Quill Assembly	Tubing (Main Transmission)	Hogo (Main Transmission)	(1) Rombyal of quill to transminuton caso.	(2) During installation of bearing to hold the vollocal which is part of quill associated the transmission. Tailo of the transmission.	Installation of
		Component Co Nomenclature	2621E	26213 7	2621K 1	(1) Ron fo trans	(2) Dun bearing which is inside t	(3) Inu

(1) Due to the arrangument (phywical location) of components in the power delivery train to the rotors, many compenents must be received to provide access to the transmission. These include main rotor blades, main rotor bub, swashplate and support assembly, control rods and drive shafts.

(2) The two center sections of pylon fairing are constructed of fibergiass and retained by many phillips head acrows. Removal and reinstallation of these fairings is time-consuming.

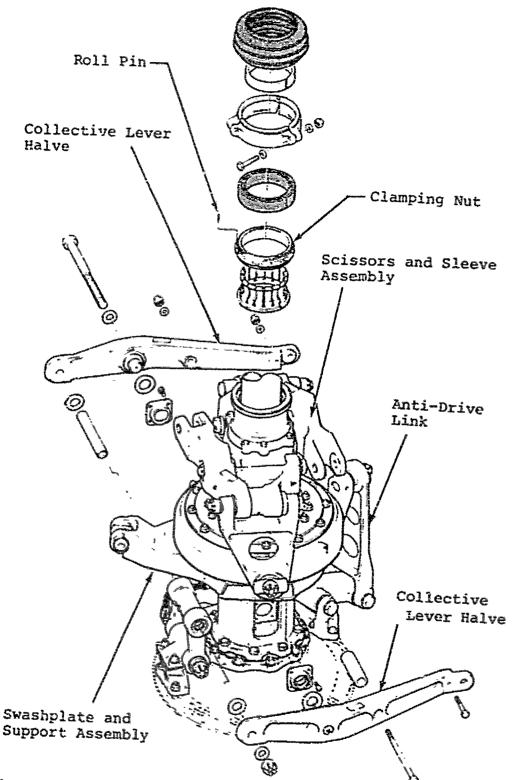
The transmission cowl doors have hinger which require custom fitting (shims) upon reinstal-Lation. (Figure 39). (4) Clamps which rotain shaft to mating couplings are supplied as metched halves. When installed, a gap will exist between the halves at the two attach bolt locations. These gaps must be adjusted to be equal within .030 inch.

(5) During manufacture, balance strips (weights) are pulled from shaft outside diameters, leaving residual adhesive (glue line). This causes some confusion on the part of mechanics who, upon scaling a patch of old adhesive, believe a balance weight has been lost during operation.

		Inspect And Tast	Ad Action and Action a	17.6	0 %	0.4 0.4	Principal de la constitución de la		mbly.
		Adjust Alfon Track Erc.					assy.	inge to	cor asse
		Orain Lube Service		÷.	00 4.6		hanger	x couplings	tail ro
		Remove / Install Compon- ent	15.8	1.5.7	12.6	0.5 A.4	ement of	e goarbo	tion of
ים	ement	Remove/ Install Bulidup					permit replacement of	from intermediate gearbox	and reinstallation of tail rotor assembly.
Continued	Task Element	Remove/ Install Other Compon-	68.4	26.9	623 3350		to permi	ron inte	_
1		Sain Access And Secure	8.3 1.0	0.1 0.1 0.1	6 A	0.0 0.4 0.4	be removed t		requires removal must be checked.
LE XIV		Fault	10.3	7.7	0 v	23.3 20.3	must be x	be disconnected	equires ust be
TABLE		Total	1.9	0 0		1.3	shafts m	must be	
en der			Man-lir Percent Note	Man-Hr Percent Note	Man-Hr Porcent Wote	Man-Mr Percent	rotor drive s	drive shafts must arbox _{13.}	teil roton geerbox belence end track
An and stated and stated and stated between the stated and stated and stated and stated and stated and stated a		Component Code and Momenclature	Hanger Assembly	Intormediate Gearbox	Tell Rotor Gearbox Assembly	Pillow Block Assembly	Adjacent tail r	(2) Two tall rotor drive si permit removal of gestbox ₁₁ ,	(3) Replacement of Upon reinstailation,
		Component Co	26413	26414	26415	20132	(1) A	(2) T permit	Upon r

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			Part of the second seco	-	***************************************	Task satement	enen	****	MANAGEMENT OF SHARE SHARES AND SHARES	PAT STREET, SECTION SE	
Component Co Nomenclature	Component Code and Nomenclature		Total	Fault	Getn Access And Secure	Remove/ Install Other Compon-	Remove/ Install Buildup	ove/ tall	or, 'n Lube	Adjust Align Track	Inspect
29133	Tripod Assembly	Man-11r Percent Note	2.0	15.0	10.02		Treens	1.0 50.0	Service .	Etc. 10.3	7est 10.0
2931.7	Droop Componsator Cambox	Man-IIr Percont	2.3	9.5	13.0			1.0		13.0	(1) 0.5 21.7
2931310	L.Inear Actuator	Man-IIr Percent Note	2.3	9.5	08 7.5			52.2		21.7	00
29321	RPM Warning Limit Detec- tion Box	Man-Hr Porcent Note	٠. ج	16.7	۲. ۶÷			29.2		41.7	9.5
(1) Whe Linkage	(1) When reinstalling the tripod assembly, a check of main Crive shaft ulignment and control	the tripod	QED8 CE	Y a ch	ack. of m	ain cri	ve shaft	al Lymne	menumenterment	control	OPERIOR MESSAGEMENT RESENTED
(2) Rep controls of detai	(2) Replacement of the linear actuator normally requires rigging the power turbine governor RPM controls and making necessary adjustments for actuator stroke. This process includes a number of detailed steps involving precise measurement adjustments. (Figure 40).	Linoar act cessary adju-	tuator ; istmenti is measi	normally for act	reguire tuator s ndjustma	a riggir eroka. nts. (F	ng tho p This pr Igure 4	ower tur ocess in 0),	bine go	vernor R a number	₩ & ,.
CO Rep.	Replacement of the detector unit nucessitates a test of the NPM limit warning system. requires engine turn-up and fine tuning of the entt to align within specified limits.	detector u Hr-up and A	insternation	ionsicate	to a tour	t of the to alig	n NPM 11	nit warn n specif	ing sys		The

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Component Co	Component Code and Romenclature		Totai	Fault Isolate	Gath Access And Secure	Hemove/ Install Other Compon- ents	Remove/ Install Buildup Items	Remove / Install Compon-	Orain Lubs Service	Adjust Align Track Etc.	Inspect And Test
29422	OII COOLAE	Man-Kr Percont	A . 2.	0.0	17.0	0.6	0.2 6.5	1.1	0.5		7.0
42211	Starter/ Genorator	Man-Ur Percont Noto	n n	25 25 25	12.1	2.60	n.o.	-25 20	3.1		6.1
575C1	SCAG Control Agrembly	Man-Hr Percent Note	°.	46.0 0.3	0 & 4 &			25.0 25.0 (C)		6.53	15.0
(1) englad flexti ing bo	(1) The starter-generator is mounted on an accessory drive pad located on the lower side of the ungine. Access to the six mounting nuts and stude involves: removing a clamp and detaching the flexible hose duct from the abroad on forward and of the starter-generator, locaning two clamp-ing bolts at the left side of inlet shroud and wliding the shrows aft. These functions are the large contributors to the component replacement time.	erator is m he six moun rom the shr t nide of i	cunted o ting nut oud on f nint shr	n an acc s and si orward c oud and	ransory tuds inv and of t	drive prologer the star	sd locat removing ber-yene roud aft	ed on the crator, large	n lower n and dot loosening	side of inching two cl	the amp-
(3	(2) Removing and in	installing the top inboard mounting nuts is difficult due to limited work space.	e top tr	board m	ounting	nuts is	difficu	ilt due 1	to limita	d work	epace.
(3) bohin (Figu	(3) Although the unbowhing the pilot's selfigure 41).	unik in located in an acce sible location for maintenance, its exposed location seat makes it vulnerable .o damage from articles stowed in the compartment.	od in an t vuiner	able :	ไblo loc ปละเพสต์	istion fi from at	or maint	towed It	lts oxpo	ssed loc spartmon	ation fr
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Pigure 35. Swashplate and Support Assembly Installation, AH-1 Helicopter.

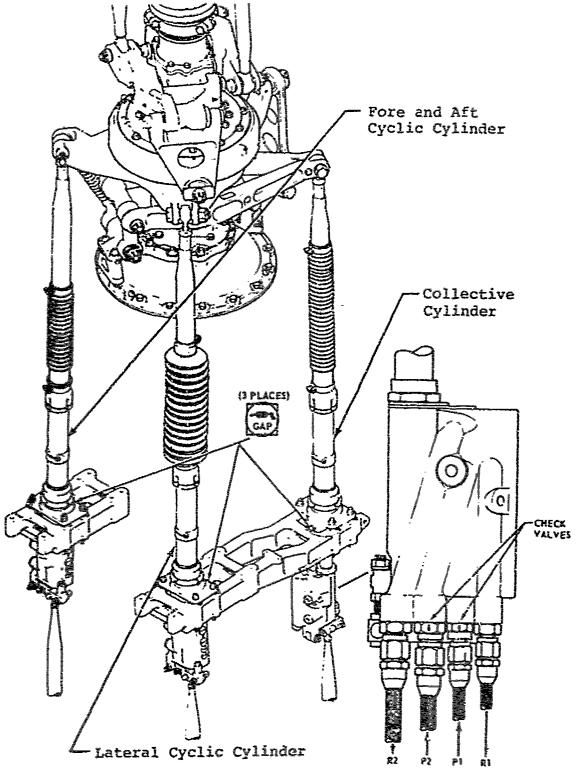


Figure 36. Flight Control Cylinder/Control Valve Installation, AE-1 Helicopter.

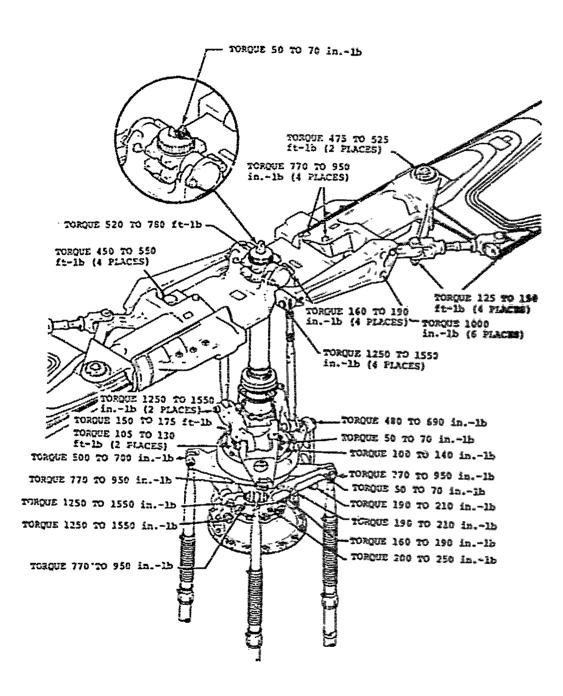
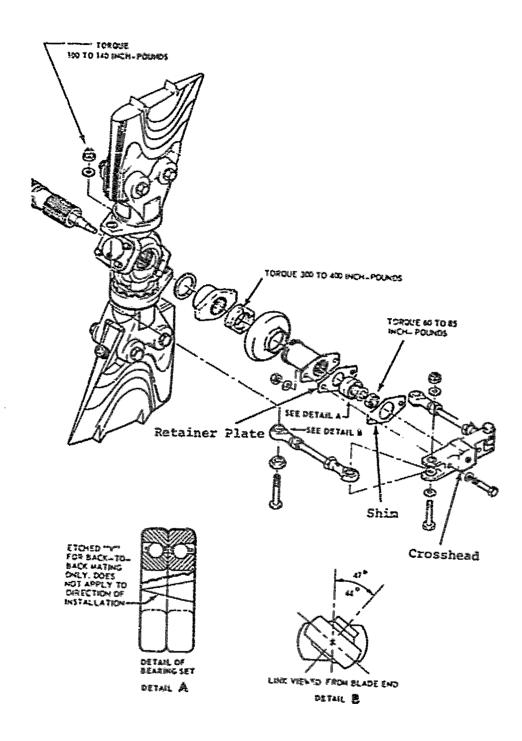
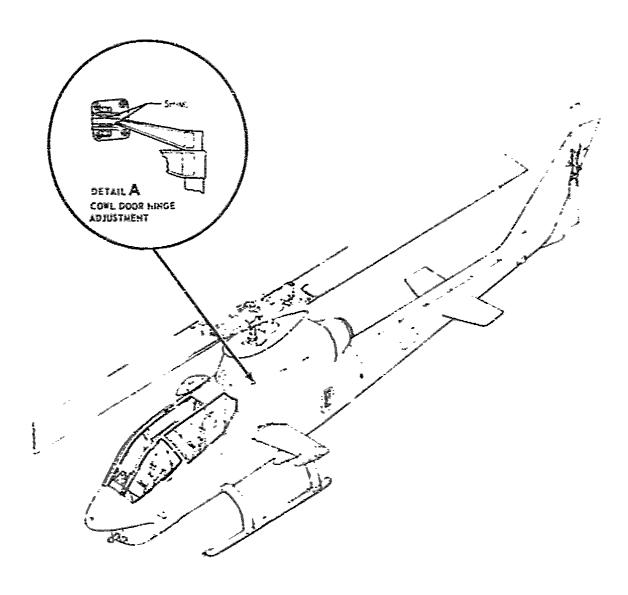


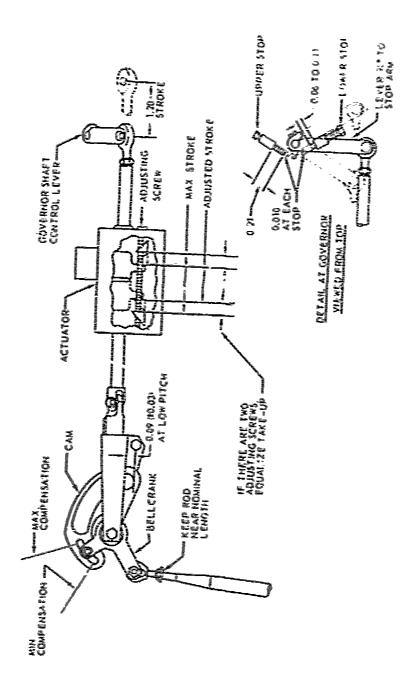
Figure 37. Rotor System Torque Valves, AH-1 Helicopter.



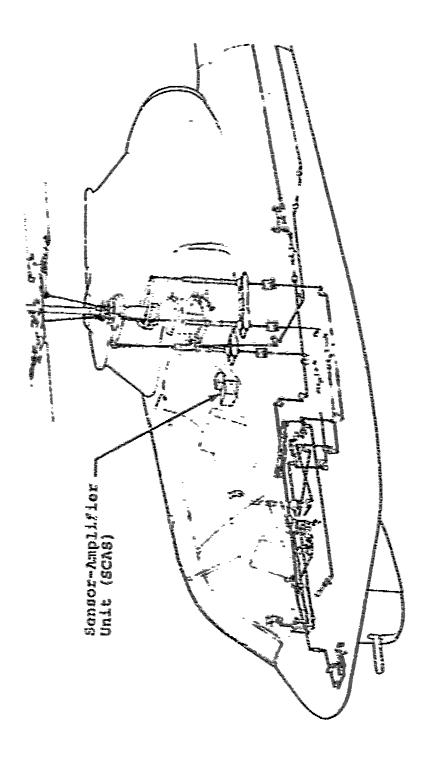
Pigure 38. Tail Rotor Installation, AH-1 Helicopter.



Pigure 39. Hinge Adjustment for Transmission Cowl Doors, AH-1 Helicopter.



Governor RPM Controls Rigging, AH-1 Helicopter. Pitante do.



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SUMMARY OF DESIGN FACTORS RELATED TO MAJOR COMPONENT REPLACEMENT, AH-1 HELICOPTER

The more significant maintainability design characteristics of the AH-1 helicopter, within the ten major component areas covered by the study, are in summary:

1. Tail Rotor System

- a. The tail rotor hub and blade installation contains many small parts and items of hardware, the removing and installing of which contributes significantly to the total maintenance time for component replacement.
- b. During installation of the tail rotor hub, the crosshead is temporarily assembled in order to measure the gap between the retainer plate and crosshead for shimming. The process of buildup, teardown and final buildup to determine shim thickness is time-consuming.
- c. Many replacement actions are a result of excessive wear of parts and components, particularly bearings. The probable cause of many failures is improper system installation and rigging.

2. Main Rotor Hub

- a. A number of different torque valves must be applied when installing the hub assembly and associated hardware, with cirtical torques witnessed and/or verified by a technical inspection.
- b. The main rotor blade bolts frequently are difficult to remove due to seizing of the bolt. When this occurs, a work aid is required to extract the bolt.
- c. Rotor tracking is normally required when the main lotor hub assembly is replaced.

Stability Augmentation System

Although the SCAS control unit is located in an accessible location for maintenance, its exposed

location behind the pilot's seat makes it vulnerable to damage from articles stowed in the compartment.

4. Transmission and Gearboxes

- a. Due to the arrangement of components in the power delivery train to the rotors, many components must be removed to provide access to the transmission.
- b. The transmission cowl door have hinges which require custom fitting (shims) upon reinstallation.

5. Pydraulic Servo Actuators

- a. Valve connections on the dual hydraulic flight control cylinders are positioned in proximity to each other. This arrangement allows little or no clearance for connecting or disconnecting the hydraulic lines. Sequential removal is required to gain access to the inboard lines.
- b. The bearing housing of the flight control cylinder valve is lubricated with grease through fittings located at the base of the cylinder assembly. These lube fittings are located in positions which provide limited access for servicing.

6. Starter-Generator

- a. Access to the six mounting nuts and studs involves removing a clamp and detaching the flexible hose duct from the shroud on the forward end of the starter-generator, loosening the two clamping bolts at the left side of the inlet shroul, and sliding the shroud aft. These functions are the larger contributors to the component replacement time.
- b. Removing and installing the top inboard mounting nuts is difficult due to limited work space.

7. Swashplate and Supporting Assembly

a. When replacing the swashplate and support assembly, a large portion of the total maintenance effort is devoted to the task of removing and installing other components.

- b. Numerous torque valves are specified for the swashplate installation.
- c. The collective lever assembly includes many small parts which must be handled during the replacement process.

8. Main Drive Shaft

- a. The quantity of grease packed in couplings is critical. The packing procedure demands precision and is time-consuming. Replacement couplings are not prepacked.
- b. Inspection requires disassembly of shaft and complete removal of old grease. Solvents may not be used. Each spline tooth is individually cleaned and visually inspected for unacceptable wear patterns and/or deterioration.

9. Power Plant Installation

- a. Teardown and buildup of the basic engine, which includes removing accessories from the old engine and installing them on the new one, represents the largest element of the replacement function. Many steps, involving disassembly and reassembly of the adapting parts in prescribed sequence, are involved.
- b. Engine replacement requires checking main drive shaft alignment and control linkage rigging. Servicing and ground functional checks are also required.
- c. Replacement of the linear actuator normally requires rigging the power turbine governor RPM controls and making necessary adjustments for actuator stroke. This process includes a number of detailed steps involving precise measurement of adjustments.

d. When reinstalling the tripod assembly, a check of the main drive shaft alignment and control linkage adjustment is required.

e dutinos ducis de la control	ТАВСЕ XV.		COMPONENT REPL	REPLAC	EMENT	DATA,	COMPONENT REPLACEMENT DATA, CH-47 HELICOPTER	HELIC	OPTER	MATANCE OF STREET	Attended to the control of the contr
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						Remove/ Install		Remove/		Adjust	
Component Cor Nomenclature	Component Code and Nomenclature		Total	Fau)t Isolate	And	Compon- ents	Buildup Items	Compon- ent	urain Lube Service	Aliga Track Etc.	Inspect And Test
14021	Gwashplate Control	Nan-Hr Percent Note	14.1	 	2.1	8.0 56.7 (1)		3.0	November of the Administration of the Admini	7.1	7.7
14060	Drive Arm Assembly	Man-lir Percent	1.8	27.8	16.7	16.7		27.8			0.2
15008	Rotary-Wing Head Appombly	Man-Nr Percont Note	10.6	7.4	9.5	4.5		3,1	7.0 7.9 (3)	13.9	0.4 n.a
15102	Shock Absorber	Man-Hr Percent	4	17.4	13.0			39.1	17.4		13.0
(1) other	(1) A large portion other components: rotor	tion of the total maintenance time is required for removal and installation of rotor blades, rotor hub, and weather protection cover.	11 main	enance (the to	require	for rer	noval an	nd finsta	llation	O.E.

Weight of these items, handling requires at least three maintenance personnol and special equipment. (Figure 42)

(2) A number of special tools and equipment are needed to replace either the forward or eft rotary-wing head assembly. The setup, use and teardown of these items contribute significantly to the maintenance time. (Figure 42)

(3) Draining oil from the bearing oil tunk and pitch varying housing is difficult due to the lack of space baidw the drain plug in which to place a container. The oil must be diverted outboard by a tray or chute to the container. (Figure 42)

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,				1	Gain Access	Remove/ Install Other	Remove/ Install	Remove/ Install	Oratn	Adjust Align	Inspect
Component Co	Component Code and Momenclature		Total	Fault Isolate	And Secure	Compon- ents	Buildup Items	Compon- ent	Lube Service	Track Etc.	And Test
15133	Notor Head Noot Assembly	Man-Hr Parcent Nota	1.9	6.1 5.3	0,3 15.8	0.3 15.8		1.0 52.7 (1)			10.5
15170	Rotary-Wing Hand Oil Tank	Man-Ilr Percent	1.2	0.0 1.0	25.0			33.3	16.7		16.7
15234	Spring Droop Stop	Man-Hr Percent Note	1.7	0.3 17.6	29.8 24.4			35.3			17.6
15271	Droop Stop (Statio)	Man-Hr Porcent Note	1.6	0.3	0.3			0.8 50.0 (3,4)			12.5
(1) boarts reguli	(1) The mathod of attaching the boot at bearing involves wrapping and tieing twins requires dexterity to insure a proper tie.	f attaching the boot at apping and tieing twine to insure a proper tie.	a boot a	•	the pitch link for around the boot. (Figure 43)		ng or the	urnbuckl dure is	the pitch link fairing or turnbuckle and at around the boot. The procedure is somewhat (Figure 43)	•	the rod-end involved and
Carre that guch	The assembly contains several small detail parts including washers, a bearing, and is required during disassembly to prevent loss of parts. The maintenance procedure the bolt be temporarily installed through the limiters, spring, washers and bearing loss.	contains several small detail parts including washers, a bearing, and ing disassembly to prevent loss of parts. The maintenance procedure porarily installed through the limiters, spring, washers and bearing	aral smal	1 detai event 1 rough t	l parts oss of i he limi(includi parts.	ng wash The mai	ere, a b ntenance nshors e	nering, a procedu	gor to	springs. specifies to prevent
(3) are no pitch locati	(3) The droop stops are bolted to the pitch, varying shaft below the horizontal pin. The stops are not interchangeable between forward and aft rotary-wing heads, but are interchangeable between pitch shafts on either head. This arrangement makes it possible to install the stops in the wrong location.	are bolted between head. Th	ited to the pitch, varying shaft below the horizontal pin. The e in forward and aft rotary-wing heads, but are interchangeable be This arrangement makes it possible to install the stops in the	pitch, v ind aft ement m	arying rotarymakes	shaft bo wing hea possibl	ilow the ids, but e to in	horizor are int stall th	erchange erchange	The stops sable betwee in the wron	ttops ttween wrong
(4) 1,6 CC and 1	(4) The zeplacement of the fixed droop stop requires rotating the rotary-wing hand until is centered over the fuselage walkway, reatraining the other plades to prevent rotating the and lifting and supporting the blade so that the droop stop is clear of the hub.	of the fis selage wal ing the bi	ted droop Lkway, re Lade so (atop rateratuit	aquires ng the droop	rotatir other bl	ug the related to	otary-wi pravent f the h	ng head rotetin		the blade

	Security States (Angel 194 of Bearing), people	And the control of th	T	TABLE XV - Continued	V - Cor	tinue	And the second s	and the statement of th	M best value that is the stream of the strea	reproductive description and description	
						Task Element	ement				NACTOR PROPERTY OF THE PARTY OF
Component Cod Nomenclature	Component Code and Nomenclature		Total	Fault Isolate	Gain Access And Secure	Remove/ Install Other Compon- ents	Remove/ Install Buildup Items	Remove/ Install Compon- ent	Remove/ Install Drain Compon- Lube ent Service	Adjust Align Track Etc.	Inspect And Test
22004	22004 Turbine Engir	no Man-Hr Percent Note	r 77.6	í	1	1.3	\$0.0 77.3 (2,3)	12.0 15.5 (4,5)	0.8	1	1.0
22074	Fire Detection Sonsing Element	on Man-Hr ant Percent Note	1. 7 1. 7	17.6	20.1			1.0 58.8 (6)			11.8
CL) Foates	(1) The fuel dist position. Sequentia of the fittings.	tributor and dump valve is located at the rear of the engine in the 6 o'clock al disassembly and attachment of the fuel lines is nocesitated by the proximity	o dunp va.	ive is lo ttachment	of the	fuel 11	ar of th	ocesita	a in the	S O'CIC	Lmity

(2) The major man-hour consumer is off-aircraft teardown and buildup (approximately 40-60 ms. hours). Numerous plumbing line runs in proximity to one another and to various engine accessories contributing to chafing problems and restrict access for accessory replacement and engine adjust-

(3) The flange on the anti-icing fairing hot air valve has studs mounted in a downward direction which hampers removal and installation of the attaching nuts. (Figure 44)

(4) The maintenance crane provided for removal of engines, transmissions and rotor components difficult to assemble and disassemble and to operate. Overhead cranes or vehicle wreckers are frequently used in lieu of the crane.

(5) The inboard engine mount is located in a high-density area with severly restricted access. A standard wrench, modified locally, improves access to the mount attachment, but the tusk of removal and installation in still difficult.

(6) The sensing element is a wire enclosed in and insulated from a thin metallic tube. Each engine has three elements which are routed around the engine components. The installation, coupled with the need to avoid crushing the fragile element, makes replacement difficult. (Figure 45)

TABLE XV - Continued	TASK EIGHT	ent Code And Fault And Secure ents items ent Service Etc. Test	Engine Oil Man-Hr 5.4 0.5 0.2 2.4 1.1 0.6 0.3 0.3 Pump Percent 9.3 3.6 44.4 20.4 11.1 5.6 5.6 5.6	Power Turbine Man-Hr 2.3 0.5 0.2 0.5 0.9 0.3 Control Percent 21.7 8.0 23.7 34.8 13.0 Actuator	Engine Startor Man-Ax 2.6 U.3 U.2 U.7 U.2 U.8 U.1 U.3 U.3 U.7 U.7 U.8 U.8 U.8 U.5 U.5 Rote (2)	Engine Exhaust Man-Hr 1.7 0.2 0.2 1.1 0.2 0.2 Cone Percent 11.8 11.8 64.6 11.8 Note (3)	(1) The installation is such that the fuel purifier or fuel boost pump, and the gas producer each ganarator, must be removed to replace the oil pump.	(2) Replacement necessitates disconnecting five flexible hoses from stationary fittings on the starter motor while holding a container under the fittings to catch hydraulic fluid. Spillnge and cleanup often result.	Maintenance procedures reguire that the tail pipe assembly be removed prior to replacing engine exhaust come.
en de ser en		Component Code and Nonenclature	22101 Engline	22128 Power Tr Control Actuato	22157 Engine	22310 Engine Cone	(1) The instance	(2) Raplace starter motor and cleanup of	(3) Mainton the engine exh

Component Code and factors of the following the following factors of the following factors of the following factors of the fac	WANTERSON WAS ARRESTED BY COMMISSION OF THE STATE OF THE	OF FOLSTWAND RECOVERS THE SERVICE AND ANY COLOR OF CHARGOS AND COLOR OF CHARGOS AND ANY COLOR OF CHARGOS AND ANY COLOR OF CHARGOS AND C	CHARLE HE BESTELLES THE SECTION OF T	A CALLEGE CONTRACTOR C	LLE XV	TCOD	Continued Task Element	COPE D. C.	of Strong Age of the Strong Strong Age of the Strong Strong Age of the Strong S	Strenseinskevermannenstraterieten im Reinass	PROFESIONAL PROPERTY OF THE STATE OF THE STA	не эксней выменности в пречине
. ~	Compo	**************************************				Sats Access	Remove/ Install	Remove	Ramove	P PHIR MINISTER IN THE REAL PRINCIPAL PRINCIPA	Adjust	MANAGEMENT DAN GARA MANAGEMENT DAN GARAGEMENT DAN G
'l '	Honord	lature	RAPAGANTHI INSPONMALANAN AMENING MENINGAN AMERIKAN	Total	Fault	And	Compon- ents	Buildup Items	Compon- ant	Cube Service	Alfon Track Etc.	Inspect And Test
~ ~! !! # #	22 23 23 24	Engine Tail. Fipe Assembly	Man-Hr Percent Note	-	11.1	2.4. 2.4.	36.9		27.8	Propriementary to commence of the form		2.01
4 C	24009	Auxillary Power Unit	Man-Hr Fordent Noto	υ, φ	0 M L M	11.1	0.6	7 0 . E	3 44.	ຕິທ		m 0
24304 APU Fuel Percent 1.4 0.2 0.6 0.4 28.6 14.3 14.3 42.8 28.6 14.3 14.3 12.8 0.6 14.4 28.6 14.3 14.3 12.8 12.8 14.3 14.3 12.8 14.3 14.3 12.8 14.3 14.3 14.3 14.3 14.3 14.3 14.3 14.3	24 1.6 0.9	APU Nydraulic Pump-Motor	Man-II Porcent Note	3.1	ი ა ბი	0 0 0 0 0 0		0.0 4.4	£ 44.	26. 24.		0.0
14.36 APU Fuel Man-If 1.8 0.2 0.6 0.7 0.1 0.2 0.2 11.1 33.3 38.9 5.5 11.1 0.2 11.1 0.2 11.1 33.3 38.9 5.5 11.1 0.2 11.1 0.2 11.1 0.2 38.9 5.5 11.1 0.2 0.7 0.1 0.1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2	24304	APU Puel Pressure Switch	Man-Hr Percent	4.4	14.3	0.6			5 3			0.0
(1) Access to the tailpipe coupling nut is through the side panel covers which can only be and installation. (2) Physical location of the unit requires that the mechanic perform tasks with his arm stretched overhead, which is awkward and tiring, The weight of the unit (approximately 70 pounds) makes lowering and lifting it into place difficult. (Figure 46) (3) The hydraulic pump-motor is attached to the APU bousing studs with six nuts and washers. (4) The hydraulic pump-motor and replace these nuts. (Figure 46)	24376	APU Fuel ROOSE Punp	Man-Ur Percent	1.8	11.1	33.9			28.0°	~!s		14.3
(2) Physical location of the urit requires that the machanic perform tasks with his arm stretched overhead, which is ankward and titing. The weight of the unit (approximately 70 pounds) makes lowering and lifting it into place difficult. (Figure 46) (3) The hydraulic pump-motor is attached to the APU bousing studs with six nuts and washers. The top-most studs are inaccessible when the unit is installed. Special tools, fabricated at the local level, are necessarible when the unit is installed.	Chened Spensed and in		lpipe comp the engine	≡	TO LE CORO	ls.		andl gov	ara whi	orted du	nly br ring ran	L. J., J., Mercenteren eventueere.
(1) The hydraulic pump-meter is attached to the APU bousing studs with eix nuts and washers. The top-most stude are inaccessible when the unit is installed. Special tools, febricated at the local level, are necessary to remove and replace these nuts. (Figure 46)	(2) overhei lowerit	Physical location ad, which is awkwar ng and lifting it	of the up. d and tiril Into place	it requi	rea that velght lt. (Fi	the me of the	chaníc g unit (ag	oerform proxima	tasks w. tely 70	Lth his (Pounds)	nkiu stre makee	tched
	The to	The hydraulic pum p-most studs are l level, are necessa	p-motor is naccessible ry to remov	attacha When t	d to the he unit eplace t	APU bo La inst	uaing at Allod. ta. (Fi	udw wiel Special gure 46	n eik nu toole, (its and w fabricat	danbers.	\$

TRA (PROFIT THANKS AND REAL REAL PROPERTY.	WERNELSON OF BUILDING APPEARS HAVE BY ANNE STORY OF THE S	melecké douvojejs se immarity yn od jourýmou offisiconomous	17	TABLE XV - Continued	Cor	rtinuod Task Flommer	C	enar enargement en de de entre en entre	enchamonistichen des seinen enchannen es	O 1965 MP18 INC. INC. COLUMN IN INC.	Ministration seem measurements
Component Cod Remenciatore	Component Code and Womenclature		fotal	Fault	Gain Access And Secure	Remove/ Install Other Compon- ents	Gain Install Remove/ Remove / Brain And Compon- Buildup Compon- Lubs Secure ents	Remove / Install Compon- ent	Drain Luba Service	Adjust Anspect Track And	Inspect And Test
26010	26010 Combining Transmission	Manr Vercent Note	7.6	4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4	2.6	1.4	0.2 1.4 1.2 3.8 2.6 18.4 15.8 36.8 (2) (3) (1)	3.8 36.8 (1)	6.6		5.3
(1) #ynchr (2) #1dan	(1) Must disconnect number seven synchronizing shaft from forward output quill and number eight synchronizing shaft from aft output quill of combining transmission. (2) Must remove two engine shafts which input to combining transmission on left and right hand sides of transmission.	iect nurber seven eynchronizing shaft from forward output quill and number eight trom aft output quill and number eight two ongine shafts which input to combining transmission on left and right-hand on.	n eynel t quil	heonizing l of comb	shaft Luing to com	from for transmits that the following the fo	remembers	ntput qu	ill and left and	number i right.	o ight hand

()) Must remove numerous elbows, reducers, urions, etc., from old transmission and install on replacement transmission. New packings or O-rings are used at each transferred fitting.

(4) Internal failures are usually detected when in incipient stage vis spectographic oil and enalysis program (80AP) samples. When transmission becomes ouspect it is drained, refilled, and placed on a reduced inspection interval schedule. This is a worthwile procedure, but it is tatine consuming.

(5) In order to remove each of three filter disc packs for inspection and/or cleaning, the oil tank must be drained to a level below the filter, an oil hose must be disconnected from the filter housing, and four nuts which retain the filter housing to the combining transmission must be removed. (Figure 47)

the drive eyetem are removed or (6) Must conduct rotor phase chack each time components of disconnected.

		lnspe-t And Test	0.0 4.7	0.5 15.7 (6,7)	ar to	7 (144)	E 02.	rotor pro- the lasion			
	ter control vessilie-probleministement	Adjust Alfign Track Etc.	20.5	0 d	In order removes. foot" type		ya, the	of the rotor As a pro- I onto the transmission			
	philipping on along the column of the column	Drain Lube Service	90.2	2.2	membly. must ko "crow's		dry comp also pam	er end of gent.			lation.
orași de la compositor	JIIRGIIIK-IIII ALIINA-IIINA KAIKUOIIIKA IIII	Remove/ Install Compon- ent	1.0	26.7 62.7 (4)	driven by, and located on, the aft transmission samewilly. for transmission removal both electric generators must be the transmission via 8 muts on studs. Cumbersome "crow's he suts.		e follow ea hydre	with low on outpu			instal
Nichalista saadiinassa saadiinassa saadiinassa	CHACL	Remove/ Install Bulldup Items		3.50 8.50	transmi tric gon du. Cum	ipped.	or of the bly, the	mating annmissi isaios, sminsion			2000
Control and and a	Took Element bear the comment	Removo/ Install Other Compon- ents		8 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 ·	cated on, the aft tr removal both alectri via 8 muts on studs.	upa ou :	transfi d nasem	iton and s the tx s transm she trans	Note 4.	Mote 6.	tcht ho
Con &	BOOMMERCANNEL (1978) THE TRANSCOME OF	Gath Access And Secure		0.0 4.0	noval bo	stroraft	requires and plac	co poolt amago co from tho and to t	sembly,	sembly,	34 25 FL
× × ×	atherethe become the best sections and sections and sections are sections.	Fault Isolate	16.7	9.5° 5.6°	delvan by, and located on, the aft tranfor transmission removal both electric the transmission via 8 nuts on stude. he nuts.	red on a	daptor a	sion intovent de	Transmission Assembly, Note	Transmission Assembly, Note	retoron
	жен жана жана жана жана жана жана жана ж	Total	2.4	42.6	nn by, and le transmission transmission uts,	ta requi	t transm drive u ucera an	tronamia od to pr er ate x finally	rranssak	renemie	ause be
INTOTALION MANAGEMENT OF THE COMMISSION OF THE C	MODBIN SKROKK RING SRAMFOR MINESKOP KAK		Man-Nr Percant	Man-Hr Percant Note	تنت	mor plating is required on aircraft so equipped.	the replacement transmission requires transfer of the following components from salon: the fan drive adaptor and plate assembly, three hydraulic pumps, the I numerous reducers and unions for fluic lioss.	replacement transmission into position and mating with lower and of the rotor. the exercised to provent damage to the transmission output seal. As a pro- aseal retainer see removed from the transmission, carefully worked onto the ranket and finally restracked to the transmission bousing as the transmissioniques 40)	no companing	olo combining	nt bolts
pillinipiliningrondbagh-dardanid Remadilaqiishijindining Abandhasa Abandhasa Vedorini	akadanda adiningandingkinakinakinakinakinakinakinakakinakakinakangkinakakakinakakinakinakinakinakinakinaki	Composent Code and Nomenclature	Synchronizing Bhaft Aunembly	Aft Trans- mission Assembly	(1) Hany accomporter are provide nufficient clearance Ench generator is secured to wrenches are need to remove t	keneval of arnor	(3) Buildup of the replacement transmission requires transfer of the following componer the removed transmission: the fan drive adaptor and place assembly, three hydraulic pumps, hydraulic pumps, hydraulic pumps,	When relaing great care must, the seal and and and of the rote sel ind it is	Rufur to 26010 C	Rofor to 26010 C	Transmission mount bolts must be ratorqued 25 flight hours after installation.
	жиникенникенний жи	Compor	26012	26013	(1) provi Ench ***enc	3	(3) the r	(4) shaft, cautlor lower of	(3)	9	3

	Gain Install Remove/ Remove/ Addust Addust Fault And Compon- Buildup Compon- Luba	Hans In Service Service Service Service Service Etc.	Saembly Note (5,) 3.8 26.2 17.2 33.8 (5,) (1,2) (3) (4)	The state of the s	forward rotor, the rotor blades, the number one and number two synchroniaing shafts, and the speed	(1) Removal of anmor plating is required on afronse and the contract transmission.	(3) buildup of replacement forward transmission requires transfer of following components from rotor tach penementor and transmission of following components from rotor tach penementors and numerous sinces and numerous sinces	rverd transmission or the adspt. tadexed and drilled to receive	Refer to Combining 26010 Transmission Assembly, note 4,	(6) nafer to Combining 16010 Transmission Assembly, note 6.		
		Gain Install Remove/ Remove/ Addust Addust Install Install Drain Align	Total Total Total Tente Secure ents Tens Track Secure ents Tens Track Secure ents Tens Track Track Service Etc.	Code and Total Fault Access Other Install Compon- Lube Track Secure ents 160,2 6.7 12.4 0.2 Etc. Salambly Note Note (5,) (1,2) (3) (4)	Component Code and Momenclature Remove/ Range Install	Component Code and Ran-Ik 39.0 1.1 1.5 10.2 6.7 12.4 0.5 17.7 14.9 (4) (6.7) (6.7) (1.2) Use to the arrangement (physical location) of components in the power delivery train to the removed to provide actualization the removed to provide actualization assy, must be removed to provide across and number two synchronizing shafts, and the special contents and c	Code and Code and Fault Access Other Install Install Drain Align Compon-Buildup Compon-Lube Track Compon-Buildup Compon-Track Compon-Buildup Compon-Track Compon-Lube Track Compon-Track Compon-Lube Track Compon-	Remove/ Lube Track Secure ents 10.2 6.7 12.4 0.2 Etc. Service E	Total Fault Acess Other Install Install Drain Adjust Acess Other Install Install Drain Adjust And Compon-Buildup Compon-Lube Track orders. 1.5 10.2 6.7 12.4 0.2 Etc. 2.8 3.8 26.2 17.2 33.8 0.3 (5) (1,2) (1,2) (3) (4) (physical lucation) of domponents in the power delivery train to the set be removed to provide access for removal of the forward transmission requires transmission requires transmission and reducers for callotte actuating cylinders. Forward transmission requires transfer of following components from the set blows and reducers for cilipht controls actuating cylinders. Forward transmission or the adapter and plate assy, is replaced, the performed by a relatively being a required by a relatively being a required by a relatively.	ponent Code and facult fault forms from forms and forms forms and forms	stall Remove/ Remove/ Install Drain Align Track mpon- Buildup Compon- Lube Track Etc. 0.2 6.7 12.4 0.2 6.2 17.2 31.8 0.5 6.2 17.2 31.8 0.5 6.2 17.2 40.5 For removal of the forward transmissioned. Enster of following components from Filght controls actuating cylinders. Fanster of following components from Filght controls actuating cylinders. Fanster of following components from Filght controls actuating cylinders. Fanster of following components from Filght controls actuating cylinders.	nover the manner. stall Remove/ Remove/ Lube Align Align pon- Bulldup Compon- Lube Track 6.7 12.4 0.2 6.7 12.4 0.2 6.2 17.2 33.8 0.5 6.2 17.2 33.8 0.5 7.1 12.4 0.5 6.2 17.2 31.8 0.5 For removel of the forward transmis ipped. For removel of the forward transmis ipped. Fansfer of following components from and plate assy. is replaced, the recent process is skilled mechanic. This process is skilled mechanic. (Figures 49 and be retorqued 25 flight hours after
THE STATE OF THE S		Gain Install Remove/ Remove/ Adjust Adjust And Compon- Buildup Compon- Luba	Total Total Total Total Tente Secure ents Items Service Track Service Service Etc.	Code and Access Other Install Install Drain Adjust Access Other Install Install Drain Align Compon- Buildup Compon- Lube Track Track Secure ents Items ont Service Etc. Service Etc. Service Etc. Seamstantion Porcent 2.8 3.8 3.8 0.2 8.8 3.8 0.5 (5.) (1.2) (3) (4)	Component Code and Renove/ Remove/ Adjust Inspection Components of Service Etc. Task And Service Etc. Task And Transmisming Percent 39.0 1.1 1.5 10.2 6.7 12.4 0.2 6.9 Assembly Note (5.) (5.) (4.) (4.) (4.) (6.7)	Component Code and Remove/ Rate Install Instal	Component Code and Remove/ Rem	Total Tatal And Compon- Remove/ Remove/ Remove/ Record Adjust And Compon- Buildup Compon- Lube Track Fault And Compon- Buildup Compon- Lube Track Fercent 39.0 1.1 1.5 10.2 6.7 12.4 0.2 Etc. Frack Fercent (Flystal lucation) of components in the power delivery train to the star must be removed to provide across For removal of the forward transmiss plating is required to alroraft so equipped. Contour head, rain shield, swambplates frontrols actuating components from and numbers and must be forward transmiss from and number of fight controls actuating continger.	Total Fault Access Giber Install Install Drain Align Compon- Lube Compon- Lube Track and Isolate Secure ents litems ont Compon- Lube Track areast 2.8 3.8 26.2 17.2 33.8 0.2 Etc. areast (5.) 3.8 26.2 17.2 33.8 0.3 (4.) 0.3 late be removed to provide access for removal of the forward transmission requires transmission requires transmission requires transmission requires transmission or the adapter and plate assy, is replaced, the head arise or the adapter and plate assy, is replaced, the performed by a relative to recome and plate assy, is replaced, the performed by a relative to recome and plate assy, is replaced, the performed by a relative to receive and plate assy, is replaced, the performed by a relative to receive and plate assy, is replaced, the performed by a relative to the received in the performed by a relative to the received in the performed by a relative to the received in the performed by a relative to the received in the performed by a relative to the received in the performed by a relative to the received in the performed by a relative to the received in the performed by a relative to the received in the performed by a relative to the received to the relative to the relative to the received to the relative to the received to the relative to the received to the relative to the relative to the received to the relative to the relative to the relative to the received to the relative to th	ponent Code and faces of the fa	stall Kemove' Remove' Drain Adjust Install Install Drain Align Align Drain Bulleu Drain Bulleu Drain Bulleu Drain Bulleu Drain Drain Bulleu Drain Drain	nover learning Remove, lube Align Install Install Drain Align Track is litems ont Service Etc. 0.2 6.7 12.4 0.3 6.2 17.2 31.8 0.5 6.2 17.2 31.8 0.5 6.2 17.2 31.8 0.5 6.3 (4) 0.5 Frankly train to the two synchronians and the service of following components from the sontrols actuating cylinders. Frankly controls actuating cylinders. Frankly controls actuating cylinders. Frankly controls actuating cylinders. Frankly controls actuating cylinders. Franklind mechanic. This process is and retarning bolt. This process is akilled mechanic. (Figures 49 and exiles

disease and other states of the states of th	i inskrikacije de generalija i secologija se vijakacija ka sa katalija sa se sa sijeka sa sa sijeka sa sa sa s Sa sa	AND THE STATE OF T	######################################	TABLE XV		- Continued	PATHETONOLIGE OF PRESSES A SPECIAL	HEOTHWALE ARE SHELDER HILLS OF THE SHELDER HILLS OF	PACINODER ED-SPRÜNZIFFINDERNEHE	SPARO, a GRI IRABBINII HYBUNIII IRABBINII IRABBINI	MUNEALLINGUENTHERMAN
						TOSK EVENE	Peneral C	HANGERMANNER IN STREET	क्षान्त्री एक्साक्षाह्माक्षान्त्री न्याव स्थाप स्थाप तथा १० था	ridentaliste alte entre cathe detaile entre c	Burkiyan dan parak de etge ol
Component Co Nomenclaturo	Component Code and Mobbenclature		Total	Fault Solate	Gata Access And Secure	Remove/ Install Other Compon- ents	Remove/ Install Gulldup Yeens	Remove Install Compon- ent	Orain Lute Service	Adjust Align Track Etc.	Inspect
26017	Engine Transmission Assembly	Man-Ik Percest Note	4. 4.		2.1. 2.1. 2.1.	20.61	4.0	4		Nacol Ind Res in Receive Resistante	6.7
6 7 9 7	fransmission Cheff Yesy.	Page 12 m 13 Ar Page 17 an agus fu	ri Fi	66 60	20 20 20 20 20 20 20 20 20 20 20 20 20 2			0.e.	00 00		% e5
	Aft. Rotor Orive Shaft	Man. Porce Notes	£ .	0 W	7 0	5 0°C	% C		주 의	5 W 6 W	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
8008 8008	Adapter Augembly Rotor Deive	Man-Hr. Percent Note	64 .	47. 00		##C		, us			
CC 00000000000000000000000000000000000	(l) Diffeulty is se engine transmission f eross thread in the s	sometimes encountered when attempting to allyn the barrel nuts into which the nuts. (Rigure 51)	untered iing bol	when at	tompelno to Tr	to all	yn tha b	seres n Sgred, t	sta Into	**************************************	miniphe-di-ametricani
3 6	lefar to 26010 C	Combining Transmission Assembly, Note 4.	um I mato	n Annand	17, KOR	÷					
(3) R	()) Hemoval of three rotor blades, aft rotor head, and controllable swashplate is required for replacement of the aft rotor drive shaft assy.	t rotor blader to rotor drive	, aft x , shaft	otor her	id, and	control	inbia aw	aahplate	Tou so	ired fo	Ŀ
		,									

(4) The mount bolts for the aft rotor drive shaft assy, must be retorqued 25 flight hours after installation.

(5) Refor to 26010 Combining Transmission Assembly, Note 6.

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(3) Hefer to 26017 Engine Transmission, Note 1.

(4) The generators are sential or the seastery gearbox or the aft transmission. The meaning arrangement consists of S russ setting the perestor to study in the gearbox besing. The republic such and the first of the reach and are in close proximity to adjacent servences.

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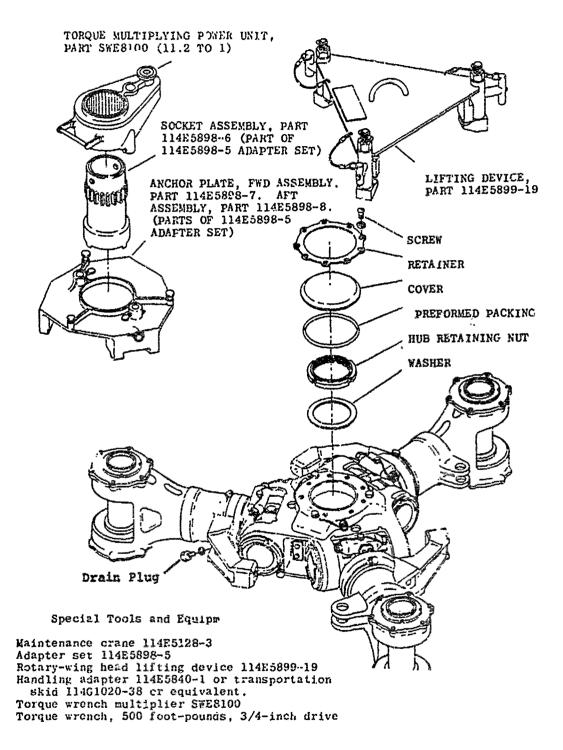
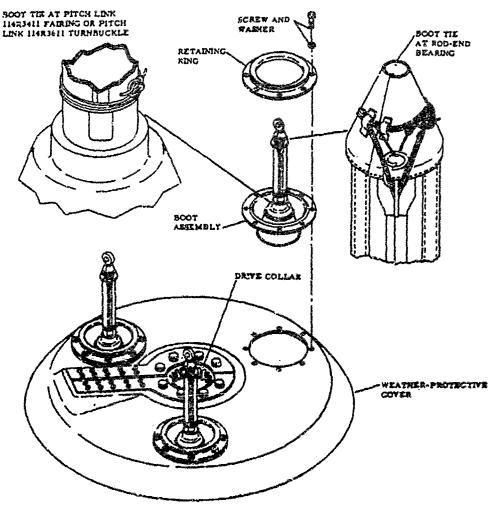


Figure 42. Rotary-Wing Head Removal/Installation, CH-47 Helicopter.



Using a twine, Type P, Class 2, make a loop approximately 1 inch long. Make the short end of the twine at least 3 inches long. Make the longer end of the twine of sufficient lengt, to make 4 to 5 wraps around the pitch link boot at the top edge of the lower zipper bulb.

Wrap the twine around the boot. Insert the longer end through the loop to form a slip knot. Then pull the twine tzut. Continue wrapping the twine around the boot to make 4 to 5 wraps, pulling with sufficient tension to prevent the boot from shifting axially on the pitch link. The the longer end and the shorter end together with a double square knot.

Cut off excess twine approximately { inch from the knot.

Using twine, make three wraps around the boot cone through the loops. Pull the twine tight and secure it with a square knot. Continue the twine through the wire tab on the zipper, through the slot on the zipper slider, and then through the loops on the boot cone again. Pull the twine tight and secure it with a double square knot.

Cut off excess twine approximately } inch from the knot.

Figure 43. Weather-Protective Cover Boot Replacement, CH-47 Helicopter.

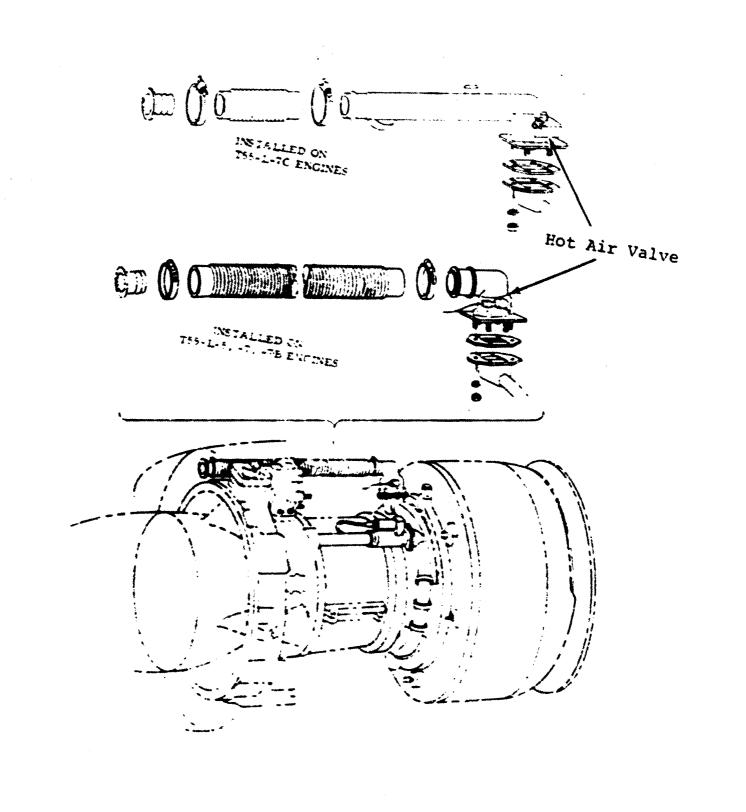


Figure 44. Engine Anti-Icing Installation, CH-47 Helicopter.

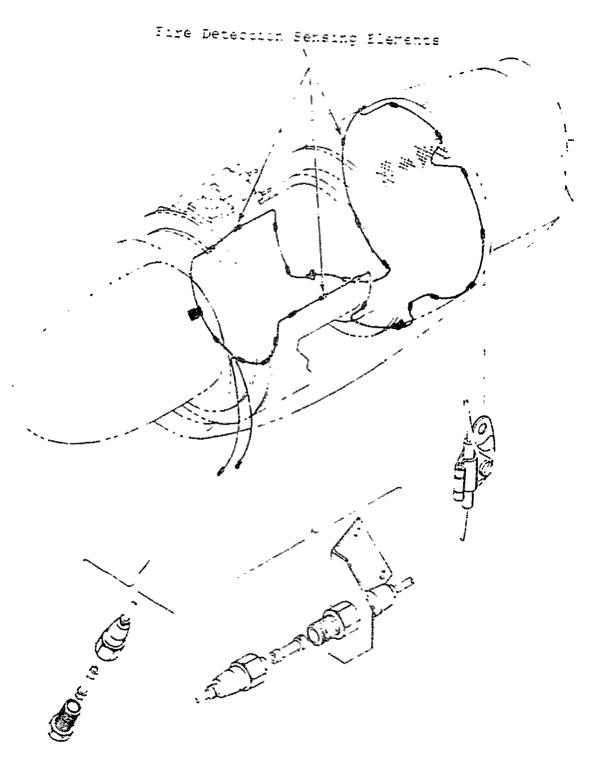
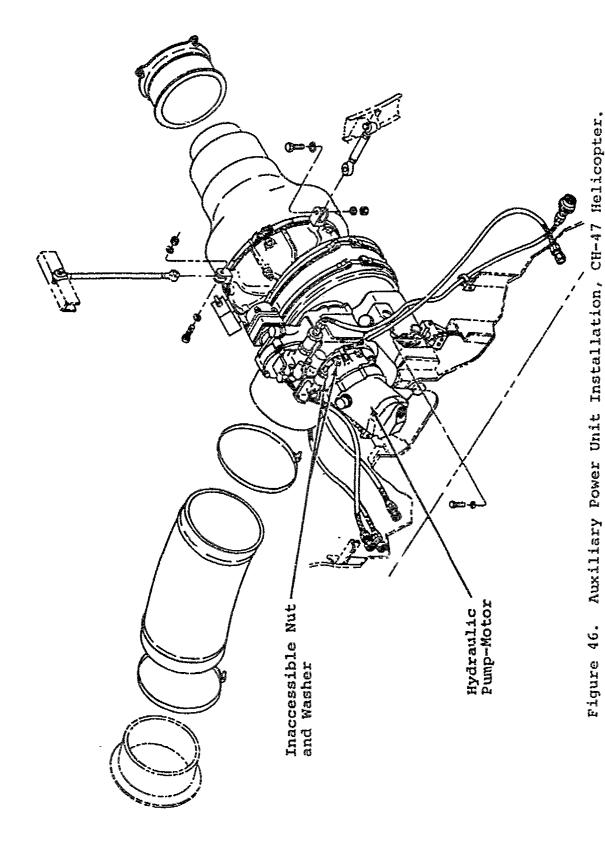


Figure 45. Engine Fire Detection Sensing Element Installation, CH-47 Helicopter.



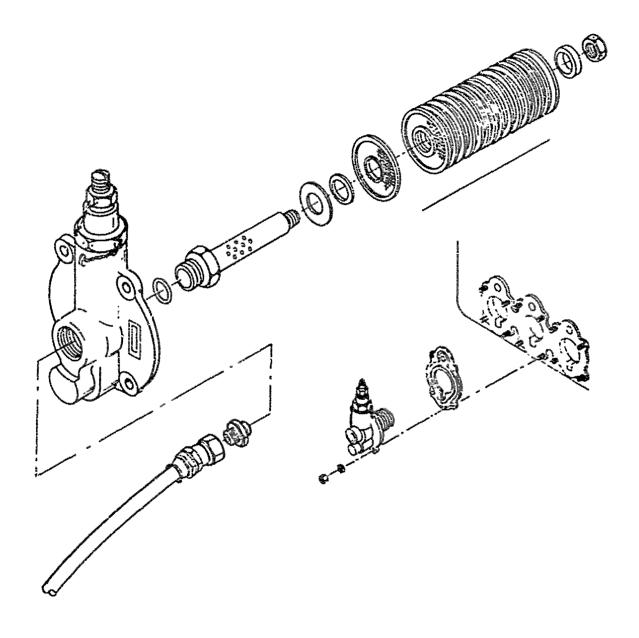


Figure 47. Filter Element Replacement, CH-47 Helicopter.

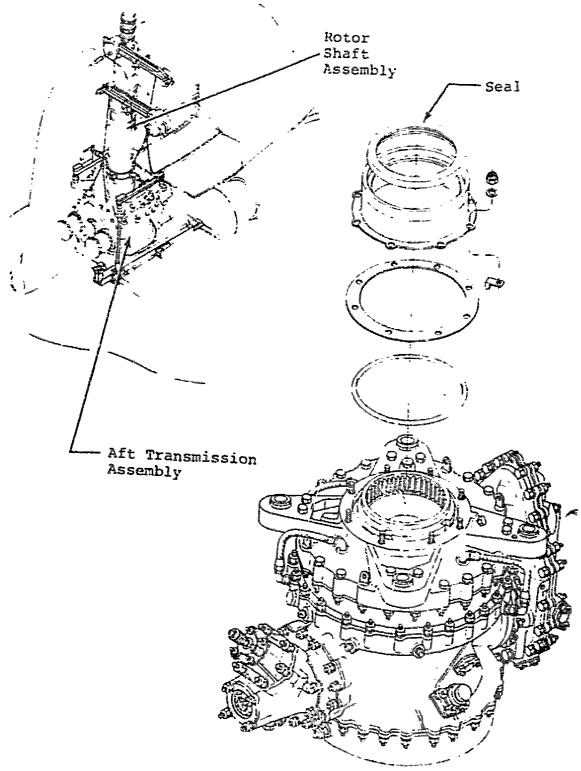
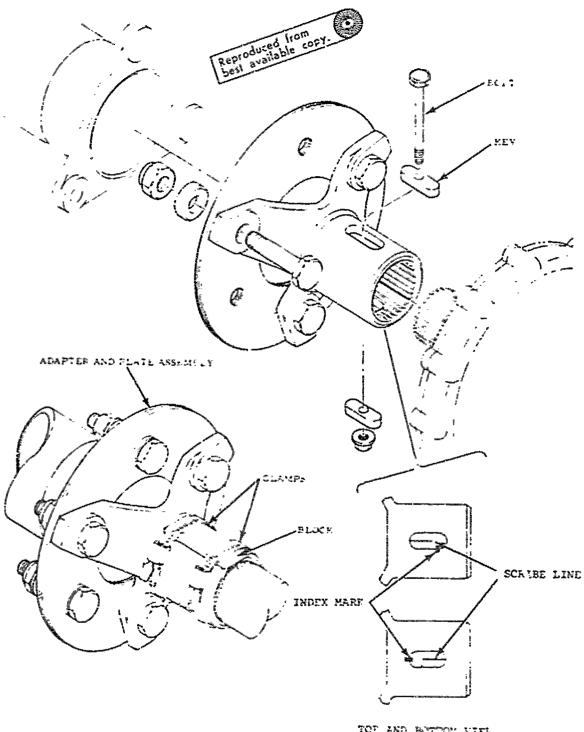
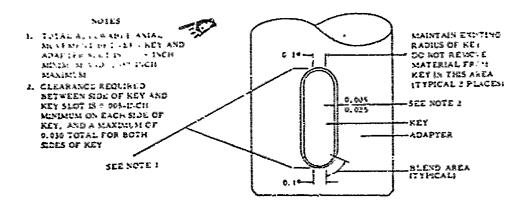


Figure 48. Mating of Transmission to Rotor Shaft, CH-47 Helicopter.



TOF AND BOTTOM VIEW OF ADAPTER ANT MITY IDENTIFICATION MARKS

Figure 49. Drilling and Indexing Adapter Keys, Installation Hardware, CH-47 Helicopter.



- (3) Place a new key (with the yellow scribe line outward) in one adapter ho)e. Shim it into the required position.
- (4) Secure the key to the adapter. Use a wood or metal block and two hose clamps. Be sure the block is centered on the key.
- (5) Obtain 21 inches of stainless steel tubing, 3/8-inch OD, 0.035-inch wall thickness. Insert it through the hole in the adapter and plate assembly and the holes in the shaft until it touches the key in the other side of the adapter.
- (6) Drill a 19/64-inch hole in the key, using the tubing as a brushing. Use an extension drill. Remove the tubing. Enlarge the pilot hole in the key to 0.375-inch. Use an extension drill.
- (7) Drill the remaining key in the same manner. Hold the previously drilled key in place with the hose clamps.
- (8) Remove the hose clamps and block while holding the keys in place.
- (9) Index each key in the adapter and plate assembly (4) to record its exact positioning in its hele. Matchmark each key and the adapter at different locations to ensure proper installation. Do not rely on the yellow scribe mark on the key.
- (10) Remove the hose clamps and keys. Remove all burrs and chips from the adapter, splined shaft, and keys. the bolt (2) and nut. Torque th Apply a light coat of grease on the key, nut to 100 to 125 pound-inches.

in the drilled hole in the key, and in the slot area of the adapter and plate assembly. Reinstall the keys into the same holes and in the same position in which they were drilled.

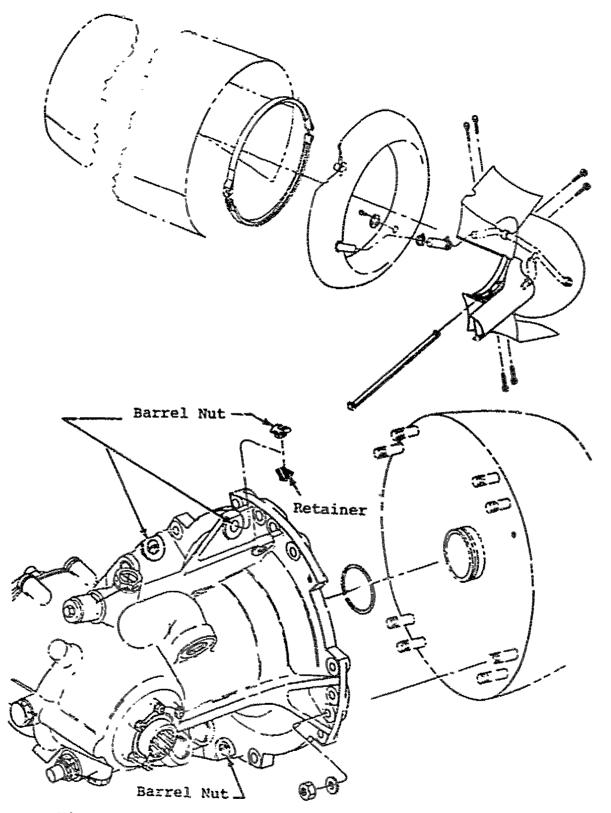
(11) Secure the keys and adapter with the bolt (2) and a new locknut. Torque the nut to 100 to 125 poundinches.

Caution

Do not use the tools to fit the bolt or the keys in the adapter and plate assembly. The fit should be easy. Forcing the bolt or keys could cause helicopter vibration and damage to components.

- (12) Check for a 0.005-inch to 0.025-inch clearance between each side of the key and the adapter slot side. The sum of the clearances on both sides sust not exceed 0.030inch. If the clearance is less than required, proceed as follows:
- (2) Remove the bolt (2), nut, and the keys from the adapter.
- (b) Hand file the side of the key as necessary to obtain the required clearances. Fork the blend area as shown in illustration. The surface of the key must be smooth and free from nicks and gouges. Do not work the ends of the keys in an area approximately 0.19 inch at the center of the radii.
- (c) After revowk, apply 2 light coat of grease to the key and key slot area before installation.
- (d) Roinstall the keys, noting the matchmarks. Secure them with the bolt (2) and nut. Torque the

Drilling and Indexing Adapter Keys, Instructions, Figure 50. CH-47 Helicopter.



Pigure 51. Barrel Nut Alignment, CH-47 Helicopter.

SUMMARY OF DESIGN FACTORS RELATED TO MAJOR COMPONENT REPLACEMENT, CH-47 HELICOPTER

The more significant maintainability design characteristics of the CH-47 helicopter, within the ten major component areas covered by the study, are in summary:

1. Main Rotor Rub

- a. A number of special tools and equipment are needed to replace either the forward or aft rotary-wing head assembly. The setup, use and teardown of these items contribute significantly to the maintenance time.
- b. Draining oil from the bearing oil tank and pitch varying housing is difficult due to the lack of space below the drain plug in which to place a container. The oil must be diverted outboard by a tray or chute to the container.
- c. The method of attaching the boot at the pitch link fairing or turnbuckle and at the rod-end bearing involves wrapping and tieing twine around the boot. The procedure is somewhat involved and requires dexterity to insure a proper tie.
- d. The spring droop stop contains several small detail parts including washers, a bearing and springs. Care is required during disassembly to prevent loss of parts. The maintenance procedure specifies that the bolt be temporarily installed through the limiters, spring, washers and bearing to prevent such loss.
- e. The replacement of the fixed droop stop requires rotating the rotary-wing head until the blade is centered over the fuselage walkway, restraining the other blades to prevent rotating the head, and lifting and supporting the blade so that the droop stop is clear of the hub. The process is somewhat involved and is time-consuming.

Auxiliary Power Plant

a. Physical location of the APU requires that the mechanic perform tasks with his arms stretched overhead, which is awkward and tiring. The weight of the unit makes lowering and lifting it into place difficult. b. The top-most hardware attaching the hydraulic pumpmotor to the AFU housing is inaccessible when the unit is installed. Special tools, fabricated at the local level, are necessary to remove and replace this hardware.

3. Transmissions and Gearboxes

- a. Replacement of the combining transmission requires disconnecting the number seven synchronizing shaft from the forward output quill and the number eight synchronizing shaft from the aft output quill.
- b. Replacement of the combining transmission includes removing numerous elbows, reducers, unions, etc., from the old transmission and installing them on the replacement transmission. New packings or O-rings are used at each transferred fitting.
- c. Internal failures are usually detected when in an incipient stage via spectographic oil analysis program (SOAP) samples. When the transmission becomes suspect, it is drained, refilled and placed on a reducedinspection-interval schedule. This is a worthwhile procedure, but it is time-consuming.
- d. In order to remove each of the three filter disc packs on the combining transmission for inspection and/or cleaning, the oil tank must be drained to a level below the filter, an oil hose disconnected from the filter housing, and four nuts which retain the filter housing to the combining transmission removed.
- e. Many accessories are driven by, and located on, the aft transmission assembly. In order to provide sufficient clearance or transmission removal, both electric generators must be removed. Each generator is secured via eight nuts on studs. Cumbersome "crows foot" type wrenchs are used to remove the nuts.
- f. Removal of the armor plating, on aircraft so equipped, is required to gain access for replacement of the forward and aft transmission assembly.
- g. Euildup of the replacement aft transmission requires transfer of the following components from the removed transmission: the fan drive adapter and plate assembly, three hydraulic pumps, the hydraulic motor, and numerous reducers and unions for fluid lines.

- h. When raising the replacement aft transmission into position and mating with the lower end of the rotor shaft, great care must be exercised to prevent damage to the transmission output seal. As a precaution, the seal and seal retainer are removed from the transmission, carefully worked onto the lower end of the rotor shaft, and finally reattached to the transmission housing as the transmission is elevated.
- Each time either the forward transmission or the adapter and plate assembly is replace, the adapter keys must be custom indexed and drilled to receive a retaining bolt. This process is time-consuming and must be performed by a relatively highly skilled mechanic.

4. Swashplate and Supporting Assemblies

a. A large portion of the total maintenance time is required for removal and installation of other components.

5. Main Drive Shaft

a. Removal of three rotor blades, aft rotor head, and controllable swashplate is required for replacement of the aft rotor drave shaft assembly.

6. Power Plant Installation

- a. The major man-hour consumer is off-aircraft tear-down and buildup. Numerous plumbing lines in proximity to one another and to various angine accessories contribute to chafing problems and restrict access for accessory replacement and angine adjustment.
- b. The fire detection sensing element is a wire enclosed in and insulated from a thin metallic tube. Each engine has three elements which are routed around the engine behind plumbing lines and engine components. The installation, coupled with the need to avoid crushing the fragile element, makes replacement difficult.

- c. The fuel distributor and dump valve is located at the zear of the engine in the six o'clock position. Sequential disassembly and attachment of the fuel lines are necessimated by the proximity of the fittings.
- d. The installation of the engine oil pump is such that the _al purifier or fuel boost pump, and the gas producer tach generator, must be removed to replace the oil pump.
- e. The flange on the anti-icing fairing hot-air valve has study mounted in a downward direction, which hampers removal and installation of the attaching nuts.
- f. The maintenance crane provided for removal of engines, transmissions and rotor components is difficult to assemble and disassemble and to operate. Overhead cranes or vahicle wreckers are frequently used in lieu of the crane.

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XVI. COMF			Man-Hr Percent	Man-Hr Percent Note	Man-fir Percent Note	(1) Mub replacement raquires removal of the six main rotor blades. The size of the blades and their distance from the ground requires at least three maintenance personnel. Several items of special support equipment are also required. (F.gure 52) (2) Sequential removal of the upper and lower brackets is required for proper removal and installation.	a G
TABLE		Component Code and Momenciature	Tail Rotor Blade	Main Rotor Head Assy.	Rotary Damper Assy.	to replacementistance from support equiduential rem	orgue val
		Component Co	15006	15007	15016	(1) Hu their d special special (2) Se lation.	(3) The to brecket to require and operations,

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Component Co. Nomenclature	Component Code and Nomenclature	Andrewski Marijerija pristrema i sedinalne	Total	Fault Isolate	And	Compon- ents	Buildup Items	Ccmpon- ent	Lube Service	Track Etc.	And Test
15021	Tail Rotor Head	Man-Br Porcent Note	8 6	4.1		59.2 (2,3)		23.5	5.1	3.1	0 to
15079	Droop Restrainer	Man-Hr Percent Note	٠: ::	20.0				1.0			13.3
15208	Bearing Pitch Change Link	Man-Hr Porcont	प र १न	C +1				35.8		21.4	0 -1 4 - 4
(1) K color ment.	when removing the	the links from the pitch sleeve from which it was	the plant	tch chang	go boam	chango beam and sleeve brackets, each removed. This is necessary to ensure	ove bra	ckets, c		link must be correct replace-	lace-
(2) C change	(2) Component replacement change links and the pitch		includes removal change beam.	val and	replace	and replacement of		r tail r	the four tall rotor blades, pitch	idos, pi	tch
e 3	Several special	tocis aro	sed durts	used during the component replacement process.	omponen	t replac	ement p	rocess.	(Figuro	53)	
(4) H must b locate	(4) Repincement of thuse be used to ensu	of the droop restrainer involves reassembling a number of detail parts. Consult correct assembly, especially proper orientation of the thrust washers the restrainer and clovis ears.	terainor scombly,	involve ospecial s cars.	s reassi ly prop	embling or orier	a numbe ntallon	r of det of the t	ail par hrust w	ts. Care ashers	o
(5) 4 etaci:i	(5) The droop angle is measured with a standard propeller stacking washers in the assembly.	is measured the assembly.	with a .	standard	propol	lor prot	protractor.	The angle	S	adjusted	¥q

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and a second		Adjust Align Track Etc.			ted to et part ttached access	to replace. their proximity	replace ribed	um noriz ole on t ogine ch cained b
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paragenerative (in gastinis recenses infest gales are	NOW CANAGORY CONTRACTOR WHEN IN THE TAX MALENTY TO THE	Remove / Install Compon- ent	11:7	1.5 83.3 (4)	e effort e engino naft. wh is requ	res more	clement spories	outhoard eleventh on On er. Thi ten bol
7	ement	Remov <i>ef</i> Install Buildup Items	40.0 75.8 (3)		ntonance lude the drive sh	requi	single no accesss.	th the directions with the directions with the the the the the the the the the t
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22043	Particle Separator	Man-Hr Forcont	ທ. ທ	4.7				4.3		5.5	11 O
22100	EAPS Blower	Man-Hr Percont	3,4	0.4			1.2	0.8	3.5.0		0.01
22113	Anti-Jan Valvo	Mun-Hr Percent	e.	23.1				0.7 53.8			23.3
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(7) The cupacity of the transmission oil system is 13 gallons. Filling the system from a 55 gallon drum using a hand pump takes a good deal of time, especially in cold ambient temperatures.

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(1) Replacement of tail rotor gearbox regulres removal and reinstallation of rotory beacon support and the tail rotor assembly. Upon reinstaination, balance and track must be checked.

(2) The pylon drive shaft must be disconnected and supported. Flight controls are disconnected at input linkage.

()) Adjacent tail roton drive whatts must be removed for replacement of hanger bearings.

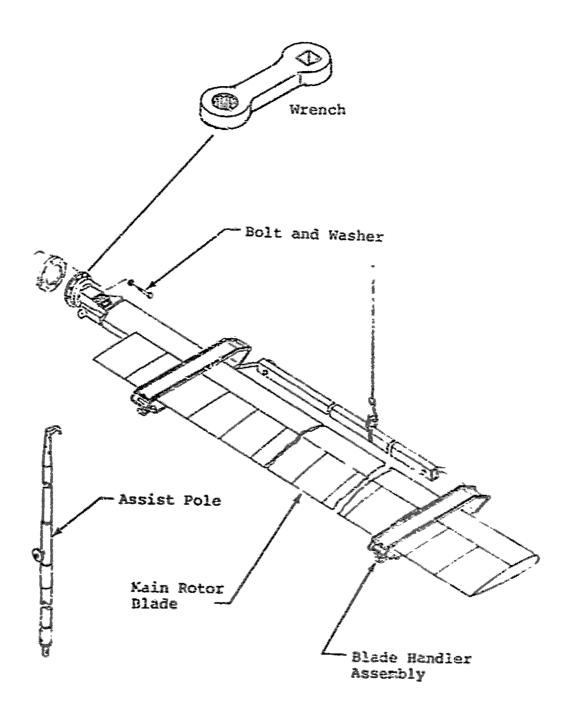
(4) Replacement of an input seal requires that the respective engine be moved forward to permit removal of the engine to transmission drive shaft.

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(5) A seal. Due to proble maints which	(9) A spanner type locknut mu"t be removed and reinstalled when replacing the rotor brake shaft seal. The torque requirement - the locknut is 400-500 ft. ibs, applied by a special socket. Due to the location the all lift where this work must be accomplished, muchanica have two problems: (a) assume a work position from which the needed leverage can be exerted; and (b) maintaining engageme tof the special socket with the spanner nut. This is a two man operation which is difficult to perform while standing on tall work stands. (Figure 58)	locknit murt be removed and reinstalled when replacing the rotor brake shallulymenet. The locknut is 100-500 ft. Ibs. applied by a special socket. The ali lift where this work must be accomplished, muchanica have two law work postition from which the needed leverage can be exerted; and (b) to the special socket with the spenier nut. This is a two man operation perform while etanding on tall work stands. (Figure 58)	be remov the locality where station for the secon	fant is this we com which will be with the will be well be with the will be with the will be with the on the beautiful to the will be with the will be will be with the will be will be will be with the will be will	100-500 100-500 ork must h the ne the spe	led when the lbs. be accommoder nut	n replaces, appliances overage of This	applacing the lipplied by a libbod, much and can be a This is a transfer a transfer a transfer sell (Figure 58)	rotor by appoint anica har kerted;	rake sha socket ve two and (b) peration	t

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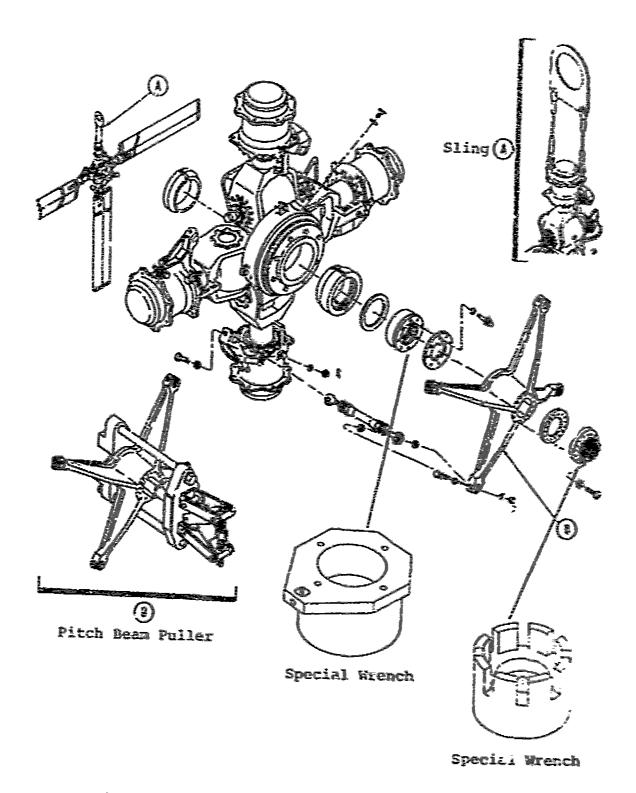
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Figure 52. Main Roter Blade Removal, CH-54 Helicopter.



Pigure 53. Tail Rotor Head Removal, CH-54 Helicoptel.

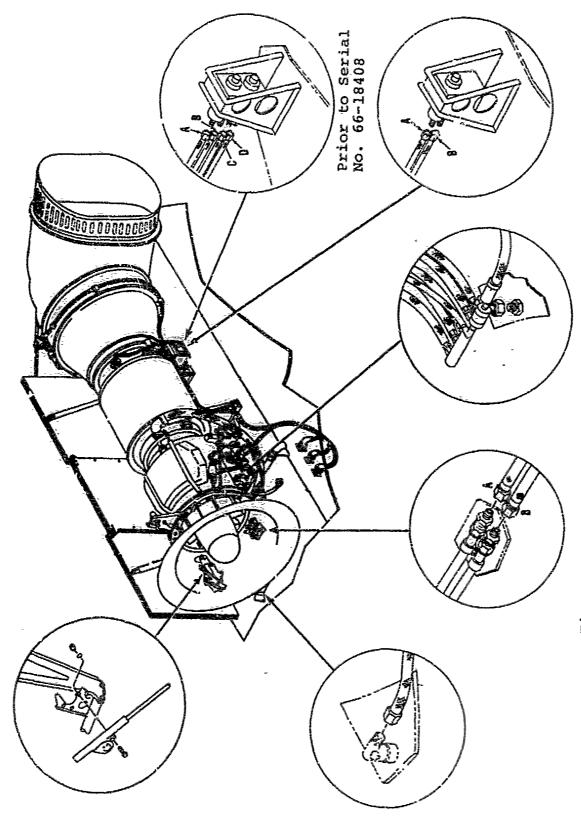
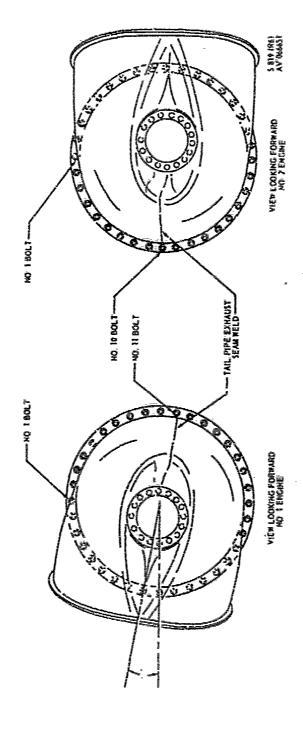
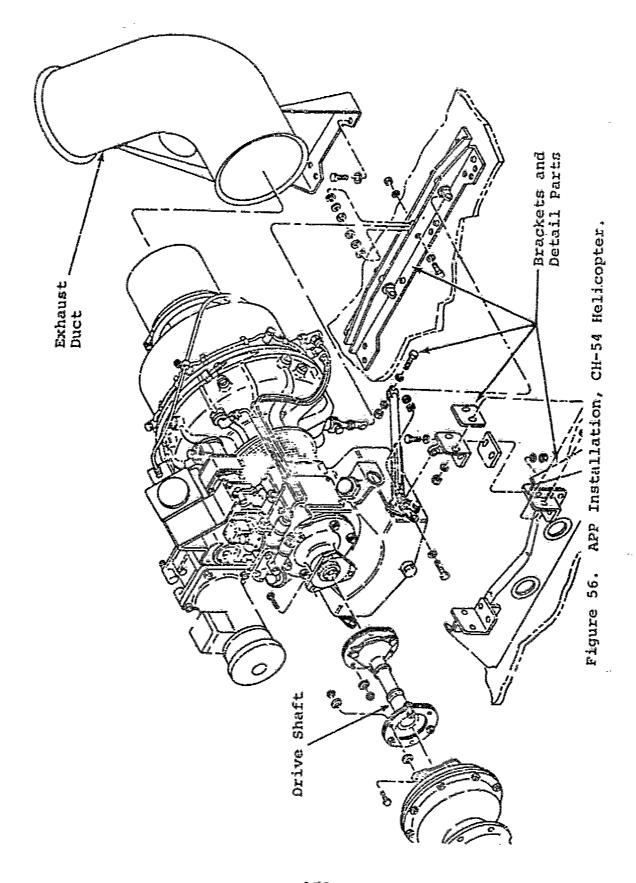
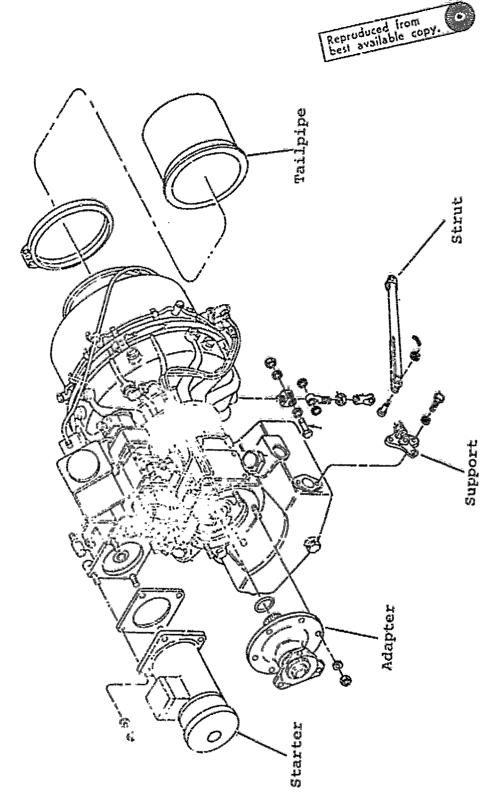


Figure 54. Engine Connections, CH-54 Helicopter.



Tailpipe Exhaust Installation, CH-54 Helicopter. Figure 55.





Removal/Installation of APP Components, CII-54 Helicopter. Figure 57.

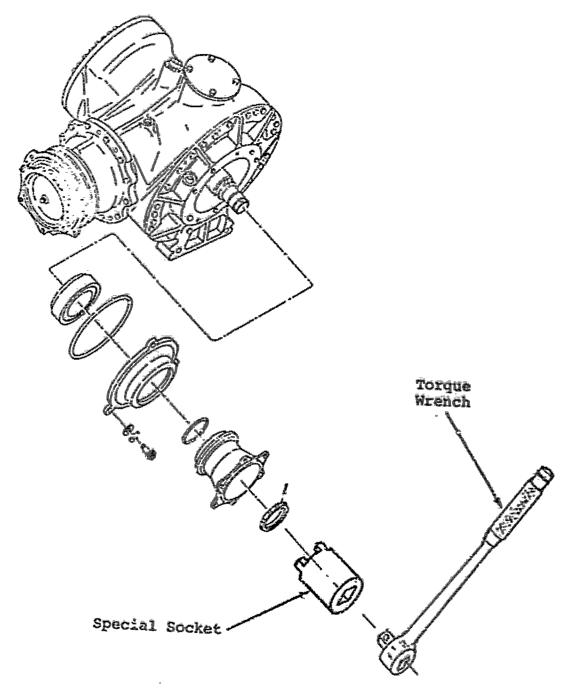


Figure 58. Removal/Installation of Pace Slotted Spanner Nuts, CR-54 Helicopter.

SUMMARY OF DESIGN FACTORS RELATED TO MAJOR COMPONENT REPLACEMENTS, CH-54 HELICOPTER

The more significant maintainability design characteristics of the CH-54 helicopter, within the ten major component areas covered by the study, are in summary:

Tail Rotor System

- a. When removing the links from the pitch change beam and sleeve brackets, each link must be color coded to the sleeve from which it was removed. This is necessary to ensure correct replacement.
- b. Several special tools are used during the wil rotor head replacement process.
- c. The tail rotor head replacement includes removal and replacement of the four tail rotor blades, pitch change links and the pitch change beam.

2. Main Rotor Hub

- a. Hub replacement requires removal of the six main rotor blades. The size of the blades and their distance from the ground require at least three maintenance personnel. Several items of special support equipment are also required.
- b. Sequential removal of the upper and lower brackets is required for proper removal and installation of the rotary damper assembly.
- c. The torque valves differ for nuts attaching the upper bracket to the upper plate and the lower bracket to the lower plate of the rotary damper assembly. Some brackets require yet another torque. Variation of torque valves within an assembly tends to slow maintenance operations.

3. Auxiliary Power Plant

a. The teardown of the removed APP engine and buildup of the replacement engine include removing and installing the adapter, tailpipe, starter, support assembly, and attaching hardware.

- b. In addition to disconnecting fuel lines, vent lines, hydraulic lines and drain lines, replacement includes removing and installing a number of fittings, brackets, support struts and associated hardware.
- c. To replace the APP clutch, the APP drive shaft must be removed and reinstalled. This task involves disconnecting and attaching the drive shaft at the clutch and at the APP flange. Each end of the shaft is attached by three bolts, washers and nuts.
- d. The replacement of the APP fue; control includes the teardown and buildup of the starter fuel solenoid valve, main fuel solenoid valve fuel inlet filter, fuel pressure switch and packings.

4. Stability Augmentation System

- a. The APCS servo unit, located in the controls compartment behind the pilot's seat, is composed of four separate banks of servo mechanisms. Assembled and installed in the helicopter, the package is congested, restricting access to rods, linkage and attaching hardware.
- b. Draining the system is required for component replacement. This involves disconnecting fittings and draining fluid into a container. Restricted access often causes spills and cleanup.
- c. The AFCS amplifier has 19 screws of two different lengths attaching the top cover to the component case. In addition to holding the cover in place, the screws also secure five cards in place within the box. The torquing of these screws causes flexing of the cards, which results in damage to the card circuitry.

5. Transmissions and Gearboxes

- a. Due to the arrangement of components in the power delivery train to the rotors, many components must be removed to provide access to the main transmission.
- b. The main transmission is secured to the fuselage via twelve mounting bolts which thread into barrel nuts. Some difficulty is experienced in aligning the nuts, and occasionally cross threading occurs.

- c. The contacting sur ace of the main transmission flange on the Sounting fittings must be sealed with sealing compound.
- d. Buildup of the replacement main transmission requires transfer of a number of components from the removed transmission.
- e. Alignment of the rotor brake package after transfer to the replacement transmission is difficult and time-consuming due primarily to its awkward position.

6. Power Plant Installation

- a. When replacing the engine, a large segment of the total maintenance effort is devoted to resoving and installing other components. These components include the engine air inlet particle separator and engine drive shaft. In particular, removing the drive shaft is difficult. A special tool is required and access to the attaching bolts is limited by the drive shaft sleeve.
- b. On the No. 1 engine the tailpipe exhaust is oriented upward and outboard 10 degrees from the horizontal centerline of the engine. This is obtained by aligning the weld with the eleventh bolt hole on the engine, starting with the top bolt hole and counting in a clockwise direction. On No. 2 engine the orientation of the tailpipe exhaust is directly away from the helicopter. This is obtained by aligning the weld with the tenth bolt hole on the engine, starting with the top bolt hole and counting in a counterclockwise direction.

- c. Teardown and buildup of accessories represent the largest single element of the replacement task. Many steps, involving disassembly and reassembly of engine accessories in prescribed sequence, are involved in the engine buildup and teardown process.
- d. The No. 1 engine, which is mounted lower to the deck, requires more time to replace. Difficulty is encountered in detaching and attaching the many connectors because of their proximity to the engine deck and lower portion of engine.
- e. The fuel control for the No. 1 engine is mounted law and inboard, adjacent to the engine deck. This low mounting profile hinders access to plumbing lines and mounting hardware.

MAINTAINABILITY CHECKLIST

The final requirement of this study was the preparation of a guide for use in technology reviews of future helicopter designs. A number of maintainability design guides have been published by the various military services over the years. These have been generally rather voluminous documents which cover maintainability in relatively great detail, addressing the subject mainly from the standpoint of qualitative characteristics. Often, such subjects as human factors and reliability are treated in the same text. Although none of the existing design guides are known to have been developed for helicopters specifically, many of the concepts in maintainability are equally pertinent to all types of hardware.

It was reasoned, therefore, that a guide for maintainability resulting from the work done in this study should not attempt to duplicate the already extensive material available on this subject. Moreover, the work accomplished and the knowledge gained from this program did not provide the basis for a "how to design" type of guide. Rather, it suggested a function-oriented guide to the maintenance factors deserving important consideration in the design of future helicopters. This, then, was the Chosen approach.

The maintainability checklist presented in the following section accomplishes three purposes: (1) it shows the generic components of current-day helicopters which historically have been the greatest man-hour consumers in each of the major mircraft systems; (2) for each of these components, the elements of the replacement task contributing most to the man-hour requirement are shown; and (3) an index to the important factors in design related to each of the task elements is given.

The maintainability checklist developed here has a tenfold application. It may be used by the designer of future helicopters to show the areas in which greatest attention is needed to effect improvements in maintainability. It may also be used by the purchaser of future aircraft as an aid in the design review process. Ideally, the checklist should not stand alone, but should eventually be integrated into a more comprehensive guide for maintainability.

The maintainability checklist presented in the pages which follow is organized in two parts. Part I, Task Elements,

lists the major components of each system which have ranked high in maintenance man-hour cost as shown by this study. The application of each component to the Army's current helicopter fleet is indicated. The elements of the component teplacement task which contribute most to the maintenance time are listed. For each of these major task elements, an index to the pertinent design considerations is given.

Design Considerations, Part II, is a tabulation of the factors involved in maintenance task performance. It is not an all-inclusive list, necessarily, but does encompass those factors found most significant in terms of the objectives and scope of the present study. The design considerations are grouped into the eight task element categories used throughout the study.

Looking at the Engine Transmission Assembly (first item on page 8 of Part I), for example, it is observed that the most time-consuming elements in replacement of this component are removing and installing the item itself, removing other components and gaining access. The important design factors related to removal and installation of the component are contained in Section E of Part II, Items 1, 2, 5, and 14. Item 1 references the requirement for special tools and equipment, Item 2 the need to disconnect and reconnect electrical wiring, etc. In the category of removing other components, the reference is to Section C, Item 19, of Part II, which indicates that a drive shaft must be removed in order to replace the transmission. Using the checklist in this manner proceeds from the high man-bour components within each system to the several most time-consuming tasks involved in replacement of each component and, lastly, to a list of the important design factors related to each of the high task elements.

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THE PART I SECURITIES TO SECURITIES SECURITI	Majar Flements of Replacement Task	Other Components Remove/Install Component Faclt Isolate	Other Components Remove/Install Component Adjust
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	Component Nomenclature	Swashylate/Support	

MAINTAINABILITY		CHECKLIST	IST	- PART T TASK ELEMENTS	Page 3
	App	Current Application	D.		Design
component Nomenclature and Description	HO	OFF/	3	u* Replacement Task	Index
		Rotor	•	System	
Droop Stop			×	Remove/Install Component Fault Isolate Inspect Test	E 27,14 A 1,20 H 2
Main Rotor Damper Assembly	×		×	Remove/Install Component Fault Isolate Inspect/Test	E 1,9,13 A 2,17,19 H 1,3
Main Rotor Hub Assembly	×	×	-	Other Components Remove/Install Component Adju t Faul Isolate	C 1,4,5,9,11,15 E 1,9,14,32 G 1 A 2,3,17,19
Main Rotor Hub Assembly			×	Othe. cmponents Remove/Install Component Inspect/Test Service	C 1,3,7,12,14 E 1,10,14,25,32 H 1,3,4,9,10 F 1,6
Tail Rotor Blade	×	×		Remove/Install Component Other Components Adjust	E 9,17,25 C 6,14,15 G 1:2,7
Tail Rotor Blade		i	×	Remove/Install Component Fault Isolate Adjust	E 9,17,27,32 A 1,3,20 G 1,2

Page 4	Design Considerations Index	C 14 E 9,10,13,14,25 G 1,2,9	C 12,13,14 E 1,9,14,25,32 H 1,2,4,7	
· PART I - TASK ELEMENTS	Major Elements of Replacement Task	100 A	Other Components Nemove/Install Component Inspect/West	
MAINTAINABILITY CHECKLIST -	Current Application UH/ OH AH CH	×	*	
TNITE	Component Nomenclature and Description	Tail Rotor Hub	Tail Rotor Hub	

MAINTAINABILITY	ł	CHECKLIST	ST - PART I - TASK ELEMENTS	Page 5
Component Nomenclature and Description	App 1	Current Application UH/ OH AH CH	Major Elements of Replacement Task	Design Considerations Index
Engine	and	Auxiliary	ary Powerplant Systems	
Anti-Ice Actuator	×		Remove/Install Component E 1 Fault Isolate A 3 Access Buildup Items D 2	13,16,27 3,14 27
Auxiliary Powerplant (Internal Mounting)		*	Remove/Install Component E Buildup Items Other Components	5,31,32 19,20,27,28 39,41
Auxiliary Powerplant (External Mounting)		×	Remove/Install Component E Buildup Items Other Components	5,26,31 19,20,27,23 27,33,34
APU Hydraulic Pump		×	Remove/Install Component E Access Service	1,3
Droop Compensator	×	×	Romove/Install Component Elinspect/Test Hl Adjust Gain Access Bl Fault Isolate	16,27 14,5 3,5
Engine Installation (Internal Fusolage Mounted)	×	×	Buildup Items Remove/Install Component E 1 Other Components C 18	7,8,9,15,16,17 1,7,9,25,27,31 18,27,39,45,46

MAINTAINABILITY		CHECKLIST	IST	- PAINT I - TASK ELEMENTS	Page 6
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Component Nomenclature and Description	HO	UH/ AH	3	Major Elements of Replacement Task	Considerations Index
Engine Installation (Exterior Pod Mounted)			×	Buildup Items Remove/Install Component E 1,5 Other Components	7,8,9,12,14,17 1,5,7,25,32 18,24,27,39,45
Engine Oil Filter	×			Remove/Install Component E 25,29 Fault Isolate A 1,2 Service F 4	a,
Engine Oil Pump			×	Other Components Remove/Install Component E 26,3	27
Fuel Pump	×			Remove/Install Component E 9,10 Fault Isolate A 18,17 Buildup Items D 2,	
Governor	×			Remove/Install Component E 9,10 Fault Isolate A 18,19 Buildup Items D 28	σ.
Linear Actuator		×	-	Remove/Install Component E 5,1(Adjust G 4,5,	5,10,16,25 4,5,8
Main Fuel Control	×	*		Remove/Install Component E 5,7, Fault Isolate A 2,3, Adjust G 11,1	5,7,10,16 2,3,18,20 11,12,13
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MAINTAINABILI	TY CHECK	LIST	MAINTAINABILITY CHECKLIST - PART I - TASK ELEMENTS	Page 7
Component Nomenclature and Description	Current Application UH/ OH AH CH	ont tion CH	Major Elements of Replacement Task	Design Considerations Index
Main Fuel Control		×	Remove/Install Component Fault Isolate Inspect/west	E 5,7,16,25 A 2,3,18,20
Oil Cooler	×		Remove/Install Component Other Components	E 5,13,27
Oil Pump		×	raurt isolate Other Components Remove/Install Component Service	A 2,12,18 C 35 E 5,27 F 1,5

MAINTAINABILITY	X.LI	CHECKLIST	- PART I - TASK ELEMENTS	Dane 0
Component Nomenclature and Description	App]	Current Application UH/ OH AH CH	Major Ele of Replacem	Design Considerati
		Drives S	System	
Engine Transmission Assembly (Pod mounted engine)		×	Remove/Install Component Other Components Access	E 1,2,5,14, C 19 B 1,2,8
Combining Transmission Assembly (Twin engine tandem rotor)		×	Remove/Install Component Other Components Buildup Items	E 1,2,5,12,14,24 C 19,20 D 5,28
Main Transmission Assembly (Hard mounted to fuse-laye structure beneath independently mounted rotor mast)	×		Other Components Access Inspect/Test	C 17,18,22,35 B 1,4,6 H 1
Main Transmission Assembly (Semi-soft mounted to fuselage structure has integral rotor mast)	×		Other Components Remove/Install Component Access	C 1,2,9,18,40,41 E 5,14 B 1,2
Main Transmission Assembly (Soft mounted in pylon structure, has integral rotor mast)	^	×	Remove/Install Component Other Components Buildup Items	E 1,2,5,14 C 1,2,9,18,22,41 D 4,18,22,25,26
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Component Nomenclature	Current Application UH/ OH AH CH	Major Elements of Replacement Task	Considerati
Main Transmission Assembly (Hard mounted to fuselage structure, has integral rotor mast)	×	ompon insta Item	4 0 C C
Main Rotor Mast Assembly (Mounted to, and integral with, the trans- mission assembly)	*	Remove/Install Component Other Components Inspect/Test	E 1,5,6,30 C 1,2,4,5,9,12 H 1,11
Rotor Mast Assembly (Tandem rotor-mounted independent of trans- mission assembly)	×	Other Components Remove/Install Component Inspect/Test	C 1,2,9 E 1,5,6,15 H 1,12,15
Forward Transmission Assembly (Tandem rotor helicopter)	×	Remove/Install Component Other Components Inspect/Test	E 1,2,5,6,20,24 C 1,8,20,21 H 1,12,13
Aft Transmission Assembly (Tandem rotor helicopter)	×	Remove/Install Component Inspect/Test Other Components	E 1,2,5,6,14 H 1,12 C 7,20,36,41,42
Intermediate Goar xx Assembly	×	Remove/Install Component Other Components Access	(A)

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	A 0 0	Current Application	ئ ە ت	and the second s	And protocollabor presidentiveness severalists deministrativeness encounteres
component Nomenclature and Description	HO	ŽĘ	3	Major Elements of Replacement Task	Considerations
Intermediate Gearbox Assembly			¥.	Remove/Install Component Fault Isolate Inspect/Test	E 2.22 A 2.4.5
rail Rotor Gearbox Assembly Removed/Installed with tail rotor drive shaft as a unit)	×			Other Components Adjust Remove/Install Component	C 6,12,22 G 14 E 2,11,14
Tail Rotor Gearbox Assembly (Disconnected from tail rotor drive shaft prior to removal)	×	×	×	Other Components Remove/Install Compinent Fault Isolate	C 6,12,22 E 2,19,29 A 2,4,5,6
Engine-to-Transmission Drive Shaft (Flexible diaphragm type	×			Access Remove/Install Component Adjust	В 1,6 В 14 С 14
Engina-to-Transmission Drive Shaft (Flexible spline type)	×	×		Service Inspect/Test Remove/Install Component	й т 17 23
Rotor Drive Shaft (One-piece long shaft, supported at trans- mission and at tail res. t diaphragm	×			Adjust Remove/Install Component I Other Components	G 14 E 18 C 6,12,17

MAINTAINABLE LITE	ITY CHECKLIST	- PART I - TASK ELEMENTS	Page 11
	Current Application	A CONTRACTOR OF THE PROPERTY O	Designation
Component Nomenclature and Description	OH AH CH	Major Elements of Replacement Task	Considerations Index
Tail Rotor Drive Shaft (Short length, supported at one end by hanger bearing and at other end by flexible spline coupling)	×	Remove/Install Component Access Fault Isolate	E 23 B 3 A 9,10,21
Tail Rotor Drive Shaft (Short length, supported at one end by hanger bearing with fiscous damper and at other end by a flexible steel disc coupling)	×	Remove/Install Component Buildup Items Fault Isolate	E 22 D 6 N 10
Rotor Drive/Snychronizing Shaft (Short length, supported at one end by a shock mounted hanger bearing and at the other end by a flexible steel disc coupling)	×	Remove/Install Component Adjust Fault Isolate	A G B L C C C C C C C C C C C C C C C C C C
Tail Rotor Shaft Hanger Assembly (Includes support bearing, flexible spline coupling, and rigid coupling)	×	Other Components Remove/Install Component Fault Isolate	C 22 A 7,11

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Component Nomenclature and Description	Application OH AH CH	Major Elements of Replacement Task	Design Considerations Index
APCS SO:	cvo unite and $\mathbf{E}1_{(}$	APCS Sorvo Unit and Blockrical Generators	
ANCO BEXTO UBIL	×	Remove/Install Component Fault Isolate Inspect/Test	E 2,8,16,28 7 1,19 H 1,3,4
Star tex/Generator	×	Remove/Install Component Gain Access Fault Isolate	E 2,3,7,17,25 B 3 A 14,18,20
den er e don	*	Remove/Install Component Fault Isolate Other Components Inspect/Test	8 2,7,8,30,32 A 13,14,19,20 G 43,44 H 1,10

HAINTAINABILITY CHECKLIST

PART II - DESIGN CONSIDERATIONS

A. FAULT ISOLATE

(Mathods utilized and/or related problems)

- 1. Cause of malfunction detected by visual inspection.
- Leaks are detected visually.
- Visually inspect for general condition, security (looseness) of component and connections.
- Internal failures are detected by magnetic chip detectors.
- Inciplent internal failures are detected by Spectooxaphic Oil Analysis Program (SOAP) oil samples.
- Gear patterns are visually checked through filler port or sight gage port.
- Disassembly, cleaning and visual inspection of individual spline teeth required.
- Check for binding and dragging of bearings by tension devices, gages, and feel.
- Out-of-balance condition usually noted via vibration in rudder pedals.

- Acceptable depth of scratches and nicks is limited and must be measured with micrometers, dial indicators, etc.
- Temperature crayon used to check operating temperatures.
- Performing a temperature measurement check by cockpit gage, temperature measurement device and/or feel.
- 13. Verifying electrical correst indicators.
- 14. Troubleshooting requires referencing electrical schematic diagrams.

- 15. Freesurizing and depressurizing flight control hydraulic system.
- le. Verifyiro hydraulio pressure indicators.
- I. Operating controls throwen full range of travel to determine obstructed travel.
- 18. Requires engine start and functional check run.
- 19. Fault or malfunction is not clearly visible and requires system testing to determine equipment status and cause of failure.
- 21. Degree of logical analysis required to determine origin of fault or malfunction.
- 11. Falance weights 'strips' are pulled from shaft during ranufacture. Mechanics see patch of old adhesive and believe weight lost during operation.

B. ACCESS

(Current provisions and/or related problems)

- Cowling secured by screws is removed and reinstalled.
- 2. Fairing secured by screws is removed and reinstalled.
- 3. Einged doors secured by daues fasteners.
- 4. Panel secured by screws is removed and reinstalled.
- 5. Fire wall secured by screws is removed and reinstalled.
- 6. Sound insulation is removed and reinstalled.
- Internal access covers and drip pan removed and reinstalled.
- Barrel nuts and polts used to secure cowling.
 Barrel nuts difficult to align and crossed threading scretimes occurs.

C. DIMER COMPONENTS

Components which must be removed to provide access to the subject component)

1. Main Rotor Blades

- 2. Main Rotor Hub.
- Weather Protective Cover. 3.
- Stabilizer Bar Assembly. 4.
- Stabilizer Dampers and Supports. ٥.
- Tail Rotor Assembly. б.
- Plight Control Hydraulic Actuator.
- Speed Trim Actuator or Yoke Assembly. 3.

- Swashplate and Support Assembly. 9.
- 10. Collar Set.
- 11. Scissors Assembly.
- 12. Plight Control Linkage.
- 13. Pitch Change Beam.
- 14. Pitch Change Links/Rods.
- 15. Main Rotor Drive Shaft Assembly (Mast).
- 16. Fifth Mount Beam.
- 17. Tail Rotor Gearbox.
- 18. Angine-to-Transmission Drive Shaft.
- Engine Transmission-to-Combining Transmission Drive
- Rotor Drive/Synchronizing Shaft. 20.
- 21. Shaft Adapter and Plate Assembly.
- 22. Tail Rotor Drive Shaft.
- Engine Assembly (disconnected and moved forward). 23.
- 24. Air Particle Separator.
- Engine Air Inlet Screen. 25.

- 26. Fuel Control Assembly.
- 27. Control Links/Rods.
- 28. Puel Boost Pump, Fuel Purifier.
- 29. Start/Main Puel Solenoid Valve.
- 30. Fuel Inlet Filter.
- 31. Fuel Pressure Switch
- 32. Tail Pipe Assembly.
- 33. APP Clutch Assembly.
- 34. APP Drive Shaft
- 35. Oil Cooler Blower.
- 36. Blower Drive Shaft.
- 37. Oil Cooler.
- 38. Oil Cooler Ducting.
- 39. Lines and Hoses.
- 40. Hydraulic Reservoir.
- 41. Hydraulic Pump.
- 42. Electric Generator.
- 43. Generator Shroud and Flexible Duct.
- 44. Rotor Tach Generator.
- 45. Electrical Leads (disconnected)
- 16. Armor Plating.

D. BUILDUP ITEMS

(List of accessories, fittings, brackets, etc. which must be transferred from removed component to replacement

1. Main Rotor Head.

- 2. Flight Control Actuators.
- 3. Rotor Brake.
- 4. Lift Link Spacer.
- 5. Shaft Adapter and Plate Assembly.
- 6. Tail Rotor Drive Shaft Support Bearing.
- 7. Power Turbine Governor.
- 8. Engine Mounting Pads/Trunnions.
- 9. Linear Actuator.
- 10. Eleed Air Control Valve.
- 11. Ignition Exciter.
- 12. Anti-Ice Valve.
- 13. Oil Filter Assembly.
- 14. Fuel Pump.
- . 15. Starter-Generator.
 - 16. Droop Compensator Cambox.
 - 17. Gas Producer Fuel Control.
 - 18. Tach Generator.
 - 19. APP Starter.
 - 20. APF Tailpipe
 - 21. Hydraulic Pump.
 - 22. Cockpit Air Blower (AH-1 only).
 - 23. Oil Cooler and support Assembly.
 - 24. Lines and Hoses.
 - 25. Electric Harness Assembly.
 - 26. Electric Generator.

- 27. Mounting Brackets and Supports.
- 28. Elbows, Reducers, Unions, Gaskets, "O" Rings, etc.

E. REMOVE/INSTALL COMPONENT (Significant or nonobvious steps of replacement task and/or related problems)

- 1. Special tools/equipment required.
- 2. Electrical wiring is disconnected/reconnected.
- Wiring diagrams must be referenced when making connections.
- 4. Bonding jumper is disconnected/reconnected.
- 5. Pressure, vent and/or drain lines are disconnected/ reconnected. Lines and ports are capped/plugged to prevent possible contamination.
- 6. Temporary covers or barrier papers are required.
- Attaching bolts, nuts, etc., are in close proximity to structure or other components. Use of wrench is difficult.
- 8. Subject component is located in congested area.
- 9. Various sized hardware are utilized.
- 10. Various torque values are specified.
- 11. Primer is applied to mounting bolts prior to reinstallation.
- 12. Stack-up under mount bolts is adjusted by washers so that one exposed thread on bolt results.
- 13. Spacers and/or shims are utilized to provide specified clearances/tolerances.
- 14. Lockwire and/or cotter pins are required.
- 15. Safety blocks must be installed on each outboard piston of pivoting and swiveling dual actuating cylinders.

- Control rods, tubes, and other linkages are disconnected/reconnected.
- 17. Control and/or rotor components are indexed by color coding for proper reinstallation.
- 18. Tail rotor, tail rotor gearbox, and tail rotor drive shaft are removed from tail boom as a unit and then separated.
- 19. Pitch change mechanism and tail rotor gearbox are removed from tail boom as a unit.
- 20. Keys which connect transmission input shaft with adapter and plate assembly must be custom indexed and drilled.
- 21. Two tail rotor drive shafts must be disconnected from gearbox couplings.

- 22. Adjacent tail rotor drive shaft is disconnected and temporarily supported.
- 23. Gaps between matched halves of coupling clamps must be equal within .030 inch.
- 24. Component cannot be lifted straight up, but must be turned and/or tilted to clear items not being removed.
- Special procedures and/or caution required for component replacement.
- 26. Numerous fittings, brackets, support studs, and associated hardware are removed/reinstalled during component replacement process.
- 27. Many small detail parts which are subject to loss or misplacement are included in the replacement assembly.
- 28. Residual pressure must be dissipated.
- 29. Dissimilar metal tape is used between faying surfaces upon reinstallation of component.
- 30. Sealing compound must be prepared and applied.
- 31. Large degree of arm, leg and back strength required by mechanic for lifting component.

32. Replacement of component requires sustained physical effort holding and carrying heavy assemblies, tools and parts.

F. SERVICE

(Current requirements and/or related problems)

- Draining/filling component and/or system with hydraulic fluid or oil.
- Requires bleeding system.
- Servicing and/or draining corrosion preventive fluid from component.
- 4. Complete oil drainage (puddled oil) requires suction gun or other device.
- 5. Priming the component with appropriate fluid.
- 6. Purging fittings with grease.
- Hand packing flexible spline couplings with grease.
 Volume of grease is very critical.

G. ADJUST

(Applicable types and/or related problems)

- 1. Tracking rothr system.
- Normally requires flight control system rigging.
- 3. Rigging cyclic control system.
- Minor adjustments to control linkages.
- 5. Normally requires rigging power controls.
- 6. Applying preload to spring.
- Perform balance of component.
- 8. Adjusting stroke length with adjustment screw.
- 9. Retorquing hardware after specific hour utilization.

- 10. Bearing friction check and adjustment.
- 11. Adjusting feedback rod ends.

- 12. Prime and adjust component.
- 13. Power check and trim adjustments.
- 14. Compression of flexible diaphragm coupling is checked with feeler gage and shimmed as necessary. Total thickness of shims is divided between two couplings.
- 15. Rotors must be brought into proper phase via mechanism in combining transmission after components in drive system are disconnected.

H. INSPECT/TEST

(Methods utilized and/or related problems)

- 1. Maintenance Operational Check (MOC) is performed.
- Mechanical components are functionally checked for proper operation.
- 3. Check for leaks.
- Flight control rigging is checked.
- 5. Neutral rig position check is performed.
- 6. Controls clearance is checked.
- 7. Bearing axial play is checked.
- Bearing recainer-to-bushing flange clearance is determined.
- Critical torque values must be verified (witnessed) by Technical Inspector.
- 10. Looseness check.
- 11. Measurement of dimension between transmission case and planetary adapter is made.
- 12. Torque on mount bolts is checked after 25 flight hours.
- 13. Torque on rotor retention nut is checked after 25 flight hours.
- 14. Disassembly of coupling is required. Each spline tooth is individually cleaned and visually inspected.

15. Aft thrust bearing lube line is temporarily disconnected and with APU operating, oil flow through line is checked.

CONCLUSIONS

The objective of this study has been to identify the factors responsible for the high expenditures of maintenance effort on selected components of current-inventory Army helicopters. Examination of historical maintenance data, engineering analysis and field surveys have been used to establish: (1) the components of each helicopter which are the greatest man-hour consumers within the classes of generic components investigated, (2) the causes for the maintenance demand on these items in terms of failure modes, maintenance frequency and average repair time, (3) the structure of major component replacement tasks in terms of discrete time elements and (4) the important factors bearing upon maintenance task performance. The thrust of the study has been on data-gathering, analysis and problem identification.

The ten major component areas set forth by the government for study each encompassed several or more types of components. Initial decisions concerning the selection of specific components to be investigated within the ten generic component classes on each helicopter were based on historical maintenance data derived from the Army TAMMS and from the Navy and Marine Corps 3-M system. The depth and quality of the data base was considered among the best available from the current military reporting systems. Much has been done by the military over recent years to improve the accuracy and completeness of field data. Despite these efforts, however, major deficiencies continue to exist. Considerable care was given to the processing and analysis of data for this program to insure that the information was being properly interpreted. This included both the manual and computer operations.

In some instances, however, the data being used to analyze the maintenance history on specific components contained obvious or suspected errors and omissions. Occasionally, it was possible to read around errors and fill blanks by judgement. More often, the data had to be accepted without qualification. Since the selection of components for detailed analysis rested heavily on the maintenance experience developed from the field data, error-free data may have altered the mix of components analyzed somewhat.

A major part of this study has been devoted to analyzing maintenance tasks and establishing the fraction of total effort expended on specifically defined functions or elements. As brought out in earlier discussions, maintenance time is substantially influenced by a variety of factors which are

seldom found exactly alike in any two maintenance operations. The maintenance time statistics resulting from this work are based on a thorough technical analysis are considered valid averages or norms for the tasks involved. It is quite possible to find significantly different numbers for these same tasks, however, depending upon the source of the data, the conditions under which it was obtained, etc. The value of the maintenance task time information contained in this report lies, therefore, not so much in its use as a time-study type of standard but more in its use for comparative analyses within and among different aircraft and components. Since the data was compiled using common ground rules and analysis techniques, it is especially suited to this latter purpose.

It is somewhat difficult to draw general conclusions from this study. Six different helicopters have been analyzed, among which there are found major differences in size, complexity and design. Accessibility and component packaging are factors which were found generally applicable to the maintenance time requirements across all models for those systems investigated. This conclusion is largely intuitive, however, considering the hardware complexity of helicopters. Rotor blades must be removed to get to the hub, the hub must be removed to get to the swashplate, swashplate to get to the gearbox, etc. The labor involved is additive - a gearbox change is necessarily time-

Plumbing and mechanical controls are areas of general similarity in all helicopters. The helicopter has, typically, a great number of fuel, oil and hydraulic lines routed through various compartments of the aircraft, often surrounding and obstructing access to other components. Such lines are frequently subject to removal in the course of maintenance operations and contribute to the maintenance consumption rate. Mechanical linkages such as those found in the flight control systems also present similar problems. They are frequently located in inaccessible locations of the aircraft and are often disconnected as a result of replacing rotor and drive system components. Subsequent rigging and adjustments also add to the time for maintenance.

Part stackups, often involving numerous details with intricate alignment or shimming requirements, are another common factor in the maintenance time problem.

These are some of the general observations in the study results. As already noted, however, the individual aircraft covered by the study are unalike in major respects and present rather unique maintenance problems in most areas. A detailed examination of the tabulated data will show the areas of greatest maintenance consumption for individual aircraft

and the specific factors involved.

One of the uses to which the results of the study may logically have application is a study of the helicopter design characteristics which influence the maintenance function. The maintenance task time data and supporting information developed here can be used to pinpoint areas of high manhour consumption where new approaches to design might offer improvement. Care is needed in the interpretation of maintenance time as an indicator of problem frequency or magnitude, however. A heavy manhour requirement is not necessarily indicative of a problem at all. Helicopter drive components, by virtue of their physical characteristics and function in the system, are traditionally greater consumers of maintenance time than less complex items of the aircraft. To concentrate attention on these components may perhaps cause more fertile areas for improvement to be neglected.

RECOMMENDATIONS

This study has identified the components of current-inventory helicopters which contribute most to the high man-hour cost of operation and quantified the problem in terms of maintenance time. No attempt has been made to develop solutions since this was beyond the scope of the task.

The logical extension of this work would be a study directed toward a better understanding of the design characteristics which complicate helicopter maintenance and the development of improved concepts for future aircraft. Solutions to helicopter maintenance problems evolve rather easily, of course, if all other considerations of aircraft design - performance, weight, cost, etc. - are placed in lower priority to maintainability. This obviously will not occur. The search for solutions to the maintenance problem must consider the ramifications of design alternatives in these other important areas.

If a design concept study evolves as the continuation of this work, it is recommended that:

- (1) The scope of the task in terms of the number of problems to be attacked not be so broad as to prohibit an adequate analysis of any one problem. Carefully considered and properly analyzed solutions should be sought.
- (2) Some type of cost-effectiveness analysis be required in any such work to provide the Government with a standard for comparing the relative merits of the various design recommendations.

PARTIE I

COMPONENT REPLACEMENT TASKS RANGED BY AV SPACE MAN-BOURS

Tables XVII through XXII list the selected components of each of the six helicopter models in descending order by average man-hours for replacement. The task frequency is shown in terms of mean-time-between-maintenance (MTRM). Man-hours per 100,000 flight-hours is also given.

TABLE XVII. COMPONENT REPLACEMENT TASKS RANKED BY AVERAGE MAN-HOURS, OH-58 HELICOPTER								
Compane	ht Code and Montesclature		A Commission and second	ANTICOPACION PROPERTY OF THE P	O C	The state of the s		
22300	763 Engine	On	p.s.	474	28.9	6,112		
25213	Hain Trans.		þ.s.	1,513	13.9	867		
15111	Main Rotor Hab	j. Ca	þ.s.	1 4,762	7.4	154		
14125	Sweetplote/Suppt. Assembly	- Ca	p.s.	2,857	6.2	215		
15211	Tail Rotor Hab		Org	1 2,631	5.4	206		
25415	hil kerer Ger Ma	Ōn .	Org	3,226	4.7	147		
15215	fail Actor Alada	Č4	þ.₃.	1,149	4.4			
2611	Engine to Trans.Drive Shaft		Ozg	1,595	3.9	236 m		
3 41	011 Onler	On .	Org	1,695	1.8	22& W		
23 34 2	Rein Puel Control	G	þ.s.	1,205	3.4	283		
2061	Gorethor	Ç a	þ.s.	1.116	3.0	229		
32361	Park Park	O h	D.S.	924	2.8] <u>30</u> 1		
24 13	Sarger Searling	Ō <u>n</u>	Org	2.222	2.8	126		
14144	Collective Servo Actuator	Ĉs.	Org	5,702	2.7			
14142	Cyclic Servo Actuator	Ōa	Ozç	200	2.5	312		
22546	Poel Cosck Valve	On	D.S.	1-213	2.2	137		
29711	Anti-Ice Control Actuator	Ĉa _	Org	4.762	2.2	44 (
24310	Droco Compensator	Ç #2.	Org	2,457	2.1	73		
42111	Starter Generator	(ta	Ozg	270	2.0	742		
773) 3	Ignition Leed	Co.	Ù1g	5,\$82	1.7	29		
22572	Labe Filter	Ca	Ozg	4,762	1.2	25		
15114	Bob Grip Beservatr	Čia,	Org	1,495	0.7	41		
2411	Tail Potor Drive Coupling	Čn .	Org	10,600	0.6	43		
		uumanuugu paguuliga kasuusiseessa ja				De -eurimoanmandurescumatochros		

7/31	ELÊ XVIII. COMPONENT						
	BLE XVIII. COMPONENT AVERAGE MAI	REPLAC N-HOUR	ement S, oh-	TASKS 6 HELI	RANKED COPTER	BY	
Compone	nt Code and Komenclature	on/Off	Paris	THE PROPERTY OF THE PROPERTY O	**************************************		
26012	Hain Transmission] On	D.S.	364	15.5	4,286	_
-220C7	Egine] On	D.S.	169	14.5	8,583	
15010	Esia Sotor Bub Assembly		l b.s.	562	8.3	1,252	
14032	Fain Sotor Swashplate	on on	D.S.	1,111	7.2	548	Hilliam to the same of the sam
25017 22052	Tail Rotor Gearbox		D.S.	283	6.7	2,324	Military Common
	011 Cooler	l on	D,S.	1,613	5.1	318	
26023	Tail Rotor Blade	i da	D.S.	4,762	3.8	20	Minimum
26126	Tail Rotor Drive Shaft	6 €	i dis.	498	3.7		
22654	Searing Seal-T/R Gearbox Gas Producer Fuel Control	Ca Ca	l D.S.	2,041	3.7	101	III A A A A A A A A A A A A A A A A A A
22044	Power Turbine Governor	l On	D.S.	633	3.6	569	Mary Manual Ann
13603	Tail Notor Hob Assembly		D.S.	1,031	3.5	139	Additional of
25019	Main Drive Shaft	On -	D.S.	429	3.2	747	ANUMINATION OF THE OWNER, THE OWN
15047	Main Motor Damper Assembly	On On	D.S.	437	2.4	550	
42055	Starter Generator	On	TER:	316	2.2	379 -	
25127	011 <u>Pilter-Mein</u> Transmission	On i	28G	699 1.667	1.2	171	
22110	Engine Oil Pilter	Óm -	Onc	100	1.0	5 0	
					D. J.	50	
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	e examination and an article and an article and an article and an article and article article article and article arti				Mind Newschild		- Company of the last
	* Annumagnature			H H Z Z POLITY I J. PROGRESS	шидэшинкод		
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	A HINNIPPHIAPPHIA			Kitakitowekkikon	HII UKalimi Progresi		
				HATIII COMMANDE	HotelahHitele		

PABLE XIX. COMPONENT REPLACEMENT TASKS RANKED BY AVERAGE MAN-HOURS, UH-1 HELICOPTER								
Concenent Code and Namenclature	And the state of t	polles-equitors, saturatutioners	A KA	A STATE OF S	Application of the property of			
22.700 T-53 Engile	ČÞ	D.S.	281	₹2.2	15,615			
26211 Main Transmission	l On	D.S.	1,163	31_ 4	/ 12,691			
19115 Main Rotor Hat Assembly	l Oa	oz e	<u>}</u> 298	11.1	3,7%			
2621C Mast Assy.	Q2	D.S.	935	10.3	1,055			
14125 Swashplate/Support Assembly	Øà.	929	794] 10.s	1,261			
22261 Fuel Regulator	On.	Örg	1,997	7.3				
7621E Fain Input Quill-Main Transmission	Ca	D.S.	909	- 7-3				
1511D Scissors/Sleave Assembly	Q ₂	D.S.	229	5.7	2,4			
22252 Fair Fael Manifold	Ōρ	Org	4,157	5.5	134			
26415 Tail Rotor Gearbox	Qμ	Org	/ 410	4.9	1,157			
2226313 Starting Puel Nozzle	0n	Org	6,667	4.4				
14141 Flight Control Cylinder/ Valve	<u>un</u>	Org	135		2,515			
15212 Tail Rotor Blade Assembly	On	b.s.	164	3.7	2,262			
15211 Tail Rotor Hob Assembly	Qu.	C.S.	130	3.5	2,760			
26117 * Main Drive Shaft	On.	Ōτg	351	3.5	- 376			
42211 Starter Generator	Ōn	• Org	1,235	3.2	259			
29261 Tailpipe	Če,	D.S.	9,091	3.1	34			
25414 Intermediate Gearbox	Ópt.	Oz ġ	617	3.1	591			
29422 3:1 Cooler	Ç=	Ozg	3,125	3.3	150			
#2111 Generator	مَوْتُ	Q ış	862	2.7	314			
2226) Starting Fuel Ramifold	SA.	Org	16,667	3.5	16			
2932i FPM Warming Detector Box	海	Org	171	2.4	1,455			
29313 Dreep Compensator Com Box	0 ≘	D.S.	7,226	2.4	In the second se			
MANIF Linear Activator	Ĉe.	Ozg	ĘĒC	2.1	Š			

	TABLE XIX - Continued								
Compone	nt Code and Nomenclature	On/Off Acft.	Level	MTBM	Avg Man- Hr	MH/FH x 105			
14118	Collective Level Assembly	On	Org	1,282	2.1	163			
29421	Oil Tank	On	Org	6,250	2.1	54			
26413	Tail Rotor Shoft Hanger	On	org	340	2.0	589			
22291	Exciter Unit	On	Org	4,762	1.8	40			
22293	Igniter Plug	On	Org	5,556	1.8	32			
2923E	Particle Separator	On	Org	12,500	1.8	15			
26411	Tail Rotor Drive Shaft	On	Org	1,064	1.7	159			
2621K	Hose-Main Tra smission	On	Org	6,667	1.7	25			
15118	Main Rotor Counterweight	On	Org	9,091	1.4	16			
2621 <i>J</i>	Tubing-Main Transmission	On	Org	9,091	1.3	15			
29132	Pillow Block .ssembly	On	p,s.	12,500	1.3	10			
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		<u></u>							

TABLE XX. COMPONENT REPLACEMENT TASKS RANKED BY AVERAGE MAN-HOURS, AH-1 HELICOPTER								
Compone	nt Code and Nomenclature	On/Off Acft.	Level	нтви	Avg Man- Hr	MH/FH x 105		
22000	T-53 Engine	On	D.S.	292	43.0	14,723		
26211	Main Transmission Assembly	On	D.S.	1,087	27.2	2,500		
2621C	Mast Assembly	On	D.S.	775	8.3	1,074		
1412B	Cyclic Swashpîate/Support Assembly	On	Org.	585	7.5	1,284		
15115	Main Rotor Hub Assembly	On	Org.	347	6.9	1,988		
2621E	Main Input Quill Assembly	On	D.S.	746	ő.4	855		
22261	Fuel Regulator	0n	Org.	3,030	6.0	200		
26415	Tail Rotor Gearbox Assembly	·Ōn	Org.	369	4.8	1,303		
29422	Oil Cooler	On	Org.	3,448	4.2	123		
15212	Tail Rotor Blade Assembly	0n	D.s.	478	3.7	773		
15211	Tail Rotor Hub Acsembly	On	D.S.	247	3.6	1,458		
26111	Main Drive Shaft	On	Org.	413	3.4	82 3		
42211	Starter/Generator	On	D.S.	1,587	3.3	207		
14141	Flight Control Cylinder/ Valve	On	Org.	244	3.2	eo£,i		
26414	Intermediate Gearbox	On	Org.	427	2.6	608		
29321	RPM Warning Detector Box	On	Org.	201	2.4	1,193		
2931J10	Linear Actuator	On	Org.	452	2.3	505		
2931J	Droop Compensator	On	Org.	3,030	2.3	77 ₁		
29133	Tripod Assembly	On	D.S.	1.408	2.0	142		
575C1	SCAS Control Assembly	On	D.S.	4,000	2.0	50		
26413	Hangel Assembly	Oπ	Org.	88	1.9	2,150		
26411	Tail Rotor Drive	On	Org.	427	1.6	374		
14118	Collective Lever Assembly	On	Org.	4,000	1.6	40		
2621K	Hose-Main Transmission	On	Org.	5,882	1.4	23		

TABLE XX	- Cont.ir	nued			
Component Code and Nomenclature 22277 Oil Hose 29132 Pillow Block Assy. 2621J Tubing-Main Trans.	On/Off Acft. On On	Org. D.S. Org.	MTBM 2,381 4,000 25,000	Avg Man- Hr 1.3 1.3	MH/FH × 105 \$4 33

TABLE XXI. COMPONENT REPLACEMENT TASKS RANKED BY AVERAGE MAN-HOURS, CH-47 HELICOPTER								
Compone	nt Code and Nomenclature	On/Off Acft.	Leve1	нетн	Avg Han- Hr	ሣዘ/FH x 105		
22004	Turbine Engine	Oz,	D.S.	78	77.6	10,000		
26013	Aft Transmission Assambly	On	D.S.	274	42.6	15,562		
26015	Forward Transmission Assy.	On	D.5.	407	39.0	9,594		
26038	Aft Rotor Drive	On	D.S.	893	19.7	2,202		
26086	Output Seal-Aft Transmission	On	Org.	465	15.0	3,220		
14921	Swashplate Control	On	D.S.	357	14.1	3,952		
15008	Rotary Wing Head	Oπ	D.S.	110	10.8	9,839		
26010	Combining Transmission	0n	D.S.	183	7.6	4,160		
24009	Aux, Power Unit	On	Org.	192	5.4	2,818		
22101	Engine Oil Pump	On	Org.	1,639	5.4	330		
26017	Engine Transmission Assy.	On	Org.	211	4,5	2,134		
45011	Hydraulic Servo Cylinder	On	Org.	225	3.7	1,644		
24169	APU Hydraulie Pupp Potor	On	Org.	3,704	3.1	30		
22157	Engine Startes	03	Org.	465	2.6	558		
26012	Synchronizing Shaft Asny.	Or	Org.	131	3.4	1,837		
15102	Slock Absorber	On	Org.	.332	2.3	693		
22128	Power Turbins	C7.	Org.	575	2.3	400		
26024	Adaptor Assy., Rot a Dri e	On.	D.S.	1,639	2.2	134		
26019	Trans., Staft Assembly	Gn	D.5.	407	2.1	517		
15133	Rotary Head Boot Assembly	On	örg.	228	1.9	633		
14060	Drive Arm Assembly	On	D.\$.	324	1.8	555		
42054	A/C Generator	On	Org.	441	1.8	408		
24376	APU Fuel Boost	On	Org.	4,167	1.8	43		
22357	Engine Tailpipe Assembly	On	Org.	10,000	1.8	19		
Аншрайимпер				Account of the party of the par				

TABLE XXI - Continued									
Compone	nt Code and Nomenclature	On/Off Acft.	- T & A & J	MT8H	Avg Hap- Hr	MK/FH × 105			
22074	Fire Detection Sensing Element	On	Org.	121	1.7	1,407			
15234	Spring Droop Stop	מס	Org.	840	1.7	203			
22310	Engine Exhaust Cone	On	org.	1,923	1.7	89			
15271	Droop Stop-Static	On	Î Ozy.	8,333	1.6	19			
		HE CAN THE COMPANY OF	- CINANDESA KANGGI HARI	N N SPECIAL II N ACCES AND A	-A-K-Froning Part-basis and and a second sec	IPRIMER RECEIVE			
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TABLE	TABLE XXII. COMPONENT REPLACEMENT TASKS RANKED BY AVERAGE MAM-HOURS, CH-54 HELICOPTER									
Compor	nent Code and Homenclature	On/Off Acft.	Leve1	HTEM	Avg Han- Hr	91H/FH x 105				
26011	Main Transmission	On	D.S.	444	97.7	21,992				
22005	Engine	On	D.S.	85	52.8	62 135				
15007	Main Rotor Head	On	b.s.	260	28.7	11,055				
25019	Tail Rotor Gearbox	On	D.S.	407	20.8	5,119				
15021	Tail Rotor Head	On	Org	323	9.8	3,041				
26049	Hain Input Seal- Main Transmission	On	D.S.	350	9.2	2,559				
26083	Rotor Brake Seal- Main Transmission	On	D.S.	467	7.1	1,519				
26042	Intermediata Gearbox	On	D.S.	549	7.1	1,296				
57027	AFCS Servo Unit	On	Org	1,333	7.1	523				
22037	Fuel Control	On	D.S.	444	6.4	1,43¥				
24014	APP Engine	On	D.5.	4,762	6.4	137				
22043	Partille Separator	()n	Ozg	1,333	5.5	413				
2\$066	Oil Pump-Hain Transmission	On	D.S.	719	5.0	6 95				
25029	Tail Rotor Drive Shaft Bearing	On	D.S.	126	4.7	3,721				
24187	APP Puel Pump	On	Org	3,125	4.4	141				
26112	Brake Disc-Main Transmission	On	D.S.	621	3.9	628				
22100	Eaps Blower	On	Crg	667	3.4	510				
24090	APP Fuel Control	On	Org	518	3.4	655				
45010	Main Rotor Servo	On	p.s.	245	3.2	1,301				
15016	Rotor Damper Assembly	On	Org	311	3.2					
24159	APP Starter	On	Org	781	3.1					
15006	Tail Rotor Blade	On	Org	114	2.9	2,544				
26324	Tail Rotor Shaft Assembly	On	p.s.	1,031	2.6	252				
										

		TABLE XXII	- Con	tinued	i			
***************************************	Compor	ent Code and Romenclature	On/Off		X	AVO -	105 TOS	
	22150		On	Org	1,333	2.6	195	
		Tail Rotor Shaft Assembly	l On	D.s.	1,687	2.5		
***************************************		APP Clutch	On	D.s.	621	2.3	1	
		Generator	On	Org	292	2.0	i i	
MANUFACTURE OF THE PERSON NAMED IN COLUMN NAME	22389	Anti-Ice Sensor	On	Org	4,762	1.9	41	
-	22028	Tailpipe Assembly	On	D.S.	88	1.8	2,042	
*	26269		On On	Org	3,125	I	51	
	15079	Droop Restrainer) On	Org	228	1.5	658	
ì	15208	Bearing-Pitch Change Link	0n	Org	360	1.4	390	
Ī		Anti-Ice Valve	Cn	Org	667	1.3	195	
MANAGEMENT .	57420	AFCS Amplifier	On	Org	4,752	1.2	24	
HIM IN NO. OF THE PARTY NAMED AND ADDRESS OF THE PARTY NAMED A						HHH.	782	
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Name in the last of the last o			-1		Ninephanomin	HERMINY KREEN 19	l	
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		PARTY	PALIKASAH KIN			#PPEIIINHEIGH-MM		
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					THE PARTY OF THE P	HERMAN INCOME		

APPENDIX II

COMPONENT ON-AIRCRAFT REPAIR TASKS RANKED BY AVERAGE MAN-HOURS

Tables XXIII through XXVIII list the selected components of each of the six helicopter models in descending order by the average man-hours required for on-aircraft repair. The task frequency is shown in terms of mean-time-between-maintenance (MTBM). Man-hours per 100,000 flight-hours is also given.

TABLE	TABLE XXIII. COMPONENT ON-AIRCRAFT REPAIR TASKS RANKED BY AVERAGE MAN-HOURS, OH-58 HELICOPTER								
Componen	t Code and Nomenclature	Om/Off Acft.	Automotive version of the control of	K61H	Avg Kan- Hr	HH/FH x 105			
	Main Rotor Hub	On	D.s.	336	7.6	2,258			
2611	Engine to Transmission	On	 Org	370	4.0	1,088			
26210	Drive Shaft <u>Kain Transmission</u>	Ozi	Org	1,111	3.8	347			
1412B	Swashplate/Suppt, Assembly	Cn	D.S.	613	3.4	546			
26416	Tail Rotor Gearbox	On	Org	331	3.1	943			
22572	Lube Filter	On	Org	1,149	2.5	218			
14142	Cyclic Servo Actuator	On	Org	459	2.3	493			
22561	Fuel Pump	On	Org	1,031	2.3	219			
26413	Hanger Bearing	On	org	474	2.0	433			
22563	Governor	On	org	926	2.0	213			
15215	Tail Rotor Blade	On	Org	990	1.8	185			
42111	Starter Generator	Oπ	Org	185	1.7	909			
22562	Main Fuel Control	On	Org	412	1.7	410			
15211	Tail Rotor Hub	On	D.S.	719	1.6	226			
15114	Eub Grip Reservoir	0n	Org	81	1.5	1,819			
14144	Collective Servo Actuator	On	Org	1,818	1.3	71			
29711	Anti-Ice Control Actuator	On	Org	7,143	1.1	16			
22593	Ignition Lead	On	Org	10,200	1.1	11			
22566	Fuel Check Valve	0מ	Org	2,381	1.0	43			
29411	0il C⊙oler	On	Org	2,857	1.0	34			
26411	Tail Rotor Drive Coupling	On	_	1,018	0.9	53			
TREATMENT THE SECOND SE									
ANTIQUENTAL PROPERTY OF THE PR									

TABLE	XXIV. COMPONENT ON-AI AVERAGE MAN-HOU	RCRAFT RS, OH-	REPAIN 5 HELD	COPTE	S RANK	ED BY
Compone	ent Code and Nomenclature	On/Off Acft.	ENDOR	ACCIONAL MARKAGEMENT AND ACCIONAL MARKAGEMENT		
15010	Main Rotor Bub Assembly	On.	P.S.	165	9.0	4,335
22062	Oil Cooler	. On	=	25,000	¥	26
22007	Esjine] ©s	D.S.	1 305	5.9	669
15003	Tail Rotor Bub Assembly	On	D.S.	9,091	4.3	42
	-					

TABLE XXV. COMPONENT ON-AIRCRAFT REPAIR TASKS RANKED							
A STATE OF THE STA	BY AVERAGE I	98-1100 	ės, v	H-1 HE	iadas Licopi	Kanke Br	D
[0@po:	neat Code and Namenclature	oa/efi		Hillion Committee Committe		Profiling adding	
1 +4112	Sain Potor Fub Assembly	On	D.5	- 1 61	4 17.		
2521E	Wain Impot Colli-Kalb Transmission	En	1 D.S.			_ [VE1
222633	10 Starting Fuel Nozzle		Org	20, Q <u>ā</u>	i i	- WHILE	
22293	lgaiter Plug		Org	4.34			23 83
14128	Swashplate/Support Masembl	y oa	Ozg	46			9.) 14
26 <u>711</u>	Main Orive Shaft	l On	Org	1,81			24 76
22262	Main Fool Manifold	e en	Oxy	2,38	1 3.4		
25413	Tail Rotor Shaft Ranger	On	Otg	1,11	. 2.6		- neggin
14141	Plight Control Cylinder/ Valve	O a	Cry	111	1 2.5	. 1	- 1
22200	T-53 Engine	e Ce					T THE SECOND
42 <u>111</u>	Generator	l Ca	D.S. Org	315 1,205		7-	- 1
15110	Scissors/Sleeve Assembly		D.S.	419			1
422 <u>11</u>	Starter Cenerator] On	(Crg	1.31		1	- 1
15118	Main Rotor Counterweight] On	Org	2,778	2.5		i
15211	Tail Rotor Bub Assembly	Ca	D.5.	532	1.9	36	- 1
14112	Collective Lever Assembly		Orş	637	1.9	30	N'hallanii
2923E	Particle Separatur		Oty	2,128	1.5		- Antonia
22291	Switer Unit	on white	Org	4,762	1.7		
26415	Tail Rotor Gastion		Ozg	293	1.6	547	ĺ
29422	Oll Cooler		Otg	2,3 4 1	1.6	6	
29321	And Marriag Defeator Daz	On I	Org	370	1.5	- 474	1
22241	N≈l Regulator	On	Org	430	1.5	315	
26411	%11 Roter Drive Shift	Os I	Ozg	1,587	1.5	95	I
	Hast Assessing	Ca [D.S.	1,449	1.4	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	
1931J 	Droop Compensator Cam Box	On w	Org	529	1.3	242	
				1			1



TABLE XXV ·· Continued						
Conjuncti	t Code and No. enclature	On/Off Acit.	Level	Miem	Avg Man- Hr	MH/FH x 105
29133	Pillow Block Assembly	On	D.S.	4,762	1.3	27
22263	Starting Fuel Manifold	On	Org	2,941	1.2	40
2621 K	Hose-Main Transmission	On	Org	4,167	1.2	28
2931510	Linear Actuator	Or.	Org	382	1.1	280
29421	011 Tank	On	Org	2,083	1.1	5.2
26414	Intermediate Gearbox	Orı	Org	735	1.0	135
26213	Tubing-Main Transmission	On	Org	4,167	1.0	25
29621	Tailpipe	On	D.S.	12,500	1.0	8
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j					}	
İ					1	
			{			1
]			
	•					

DIA	LE XXVI. COMPONENT ON					
TAS.	A MANAGEMENT OF THE	-AIRCRA	et her	AIR TA	SKS RA	NKED
	BY AVERAGE		URS, A	H-1 HE	LICOP1	<u> ER</u>
Ī	ent Code and Nomenclature	9a/Gff Acft.	Pinet	Miletanue Baumananue A. V. V. V. V. V. V. V. V. V. V. V. V. V.		187.53 187.53
14125	Cyclic Swashplate/Support Assembly	On .	Org.	325	4.8	######################################
] 2621 <u>5</u>	Main Input Quill Assembly	3	u.s.	2,351		
14141	Flight Control Cylinder/ Valve		Org.	303	3.5	Post Section
22266	T-53 Doyline	ļ On	ļ p.s.] 725.	3.0	
29422	Oil Cooler	Į On	Org.	3,036	2.6	37
42211	Starter/Generator	Î On	D.S.	826	2.2	269
262 <u>]</u> ¢	Mast Assembly	l On	D.S.	1,136	1.8	157
15115	Main Rotor Rub Assembly	Op.	Org.		1.5	366
29133	Tripod Assembly	l Ca	į D.S.	1,493	1.5	103
14188	Collective Lever Assembly	l Ca	Org,	3,448	1.4	42
26213	Tebing-Wain Transmission	מס	Ceg.	7,692	1.3	17
2932 <u>1</u>	NA Reming Detector Box	l On	Ozg.	189	1.2	£35
575C)	SCAS Control Assembly	Cn	D.S.	4,762		24
2931310	Momer Actuator	i on i	Org.	303	1.0	3*6
26411	Tail Rotor Drive Shafe Assembly	io i	Org.	825	1.0	114:
22 2 \$1	Fuel Regulator	i on s	Org.	8361	9.9	***
15212	Fail Rotor Black Assembly	Ca I	D.s.	2.174	e.9 [42
29132	Pillow Slock Aspendly	Ca I	D. 5.	7,6921	0.9	
26415	Tail Botor Gearbox	On ,	Org.	629	0.8	11
26414	Intermediate Gearbox	Ča į	CTQ.	885	4. 0	129
iyala	grood Combergator Can por		Org.	4521	v.o	85
1621K	Bose-Yein Transitsion	Ca iii	Org.	5,882	9. <i>7</i>	155
4277	Oil Pose	On I	Org.	2,0002	V.Q.	10 22
	annease principal	en in 1880-week a. do.	- HIROMWINIM		Manufacture & A A	**
_ <u></u> _						

TABL	E XXVII. COMPONENT ON					
	E XXVII. COMPONENT ON BY AVERAGE M	ALMUNA NOUI-RA	CS, CH	PAIR THE	ASKS I LICOPI	anked Er
Compone	ent Code and Mosenclature	Ge/Off Acft.	HIDELINES SENTE	TOO ON THE STREET STREE		A Land of the land
42054	A/C Generator	MILLER STREET		WALLE WELLEN	CPITHER, AND ALLOSS IN	Total Indicate Alloide
22357	Engine Tailpipe Assembly			1,49)		£53
26038	Aft Rotor Drive Shaft	100	l Org. D.s.	160,600		4
22974	Pire Detection Sensing		ors.	8,657 1,667	7.5	39 137
24069	Aux. Power Unit			·	1 1 2.0	***************************************
22101	Engline Oi? Fromp		Crg.	7,692	2.0	
L5133	Rotaty Read Boot Assembly		Org.	2,554	1.5	27
\$ 601 0	Combining Transmission	l ca	D.S.	699	1.2	#
16173	Chip Detector-Engine Transmission	Ca.	Org.	3,726	1.1	159 24
5271	Droop Stop-Static	Ça	Org.	12,500	1.0	
6016	Forward Transmionion Assembly	Čn.	D.S.	1,429	0. 6	5
6013	Ath Manufacturion Assembly	Ca	D.S.	146		35
	ANIMAN MANAGEMENT AND ANIMAN ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND ANIMAN AND A		,	*** E	8.2	114
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	e or Anneana		M, Phillingillin			
	THAN THE PARTY OF	Political				
					Minister of the contract of th	Hills and points
	иниро-учина на применения на применения на применения на применения на применения на применения на применения				W-Labour	
	Miniman and a second			Pillidallini		
	ипанення фанализация	TOTAL DESIGNATION				
				mis-s-s		

TABLE XXVIII. COMPONENT ON- BY AVERAGE MA					
Component Code and Nomenclature	On,Off Acft.	Level	MTRM	Avg Man- Hr	MH/FH x 105
24014 APP Engine	On	D.S.	719	60.0	8,346
22005 Engine) On	D.S.	199	6.9	3,473
15006 Tail Rotor Blade	On	D.S.	83	3.3	3,996
15021 Tail Rotor Head	On	Org.	3,125	3.3	107
 26042 Intermediate Gearbox	On	D.S.	847	2.8	330
24038 APP Clutch	On	D.S.	4,762	2.8	59
22028 Tailpipe Assembly	On	D.S.	781	2-4	311
26260 Chip Detector - Tail Rotor Gearbox	On	Org.	1,887	1.8	94
22369 Anti-Ice Sensor	On	Org.	9,091	0-5	5

APPENDIX III

COMPONENT OFF-AIRCRAFT REPAIR TASKS RANKED BY AVERAGE MAN-HOURS

Tables XXIX through XXXIII list the selected components of five of the six helicopter models in descending order by average man-hours required for off-aircraft repair. The task frequency is snown in terms of mean-time-between-maintenance (MTBM). Man-hours per 100,000 flight-hours is also given.

On/Off Acft.	Level		Avg Man-	
}	LEVEL	METM	Hr.	MR/FH x 105
Off	D.S.	93	10.0	10,773
Off	D.S.	139	10.0	7,211
Off	D.S.	177	7.0	3,989
Off	D.S.	195	4.0	2,064
Off	D.S.	212	2.0	932
O:f	-	33,333	1.7	Name of the state
PERSONAL REPORTERS			***************************************	Newskielen in the state of the
	Off Off Off	Off D.S. Off D.S. Off D.S.	Off D.S. 139 Off D.S. 177 Off D.S. 195 Off D.S. 212	Off D.S. 139 10.0 Off D.S. 177 7.0 Off D.S. 195 4.0 Off D.S. 212 2.0

TABLE	XXX. COMPONENT OFF- BY AVERAGE MAN					KED
Componen	t Code and Nomenclature	On/Off Acft.	Fekej	нтви	Avg Han-	MH/FX x 105
22200	T~53 Engine	monomore C.F.	p.s.	781	19.2	2,450
22262	Main Fuel Manifold	off	D.S.	50,000	17.2	28
15211	Tail Rotor Hub Assemuly	off	D.S.	249	3.7	1,563
26111	Main Drive Shaft	Off	D.S.	870	3.7	425
29621	Tailpipe	Off	D.S.	33,333	2.8	9
26413	Tail Rotor Shaft Hangar	OFF	G.S.	909	2.5	<u> </u> 272
2931Jl0	Linear Actuator	off	D.S.	1,538	2.0	127
29321	RPM Warning Detector Box	off	D.S.	179	1.6	1,000

TABLE	XXXI. COMPONENT OFF- BY AVERAGE MAN					ANKED
Componen	it Code and Homenclature	On/Off Acft.		KTSK	Avg Han- Hr	XX/FIS
22200	T-53 Engine] off	D.S.	2,381	15.3	641
15115	Main Rotor Hub Assy.	off	D.S.	685	11.7	1,715
26111	Main Driva Chaft	off	D.S.	685	3.3	489
15211	Tail Rotor Hub Asey.	off	D.S.	704	2.8	395
26413	Hanger Assy.	OZ£	D.S.	312	1.8	595
293 <u>1</u> J10	Linear Actuator	off	D.S.	1,205	1.2	101
29321	RPM Warning Detector Box	off	D.S.	224	1.1	493

TABLE	XXXII.	COMPONENT OFF BY AVERAGE MA					
Compone	nt Code and	Nomenclature	On/Off Acft.	Level	NTEN	AYD.	MH/FH x 105
24009	Aux. Power	Unit	cii	D.S.	645		18,250
15008	Rotary-Win	Head Assembly	off	D.S.	400	60.0	 20,039
22004	Turbine Eng	ine	off	D.S.	200	79.9] 35,930
36016	Porward Tra	namission Assy.	off	D.S.	1,163	24.0	2,075
26010	Combining 1	Transmission	off	D.S.	637	23.9	3,757
24169	APU Hydraul	ic Pump-Motor	Off	D.3.	7,692	18.9	253
26019	Transmissio	m, Shaft Assy.	off	D.Š.	1,754	13.9	787
26017	Engine Tran	saission Assy.	off	D.S.	304	12.2	4,026
14021	Swashplate	Control	Off	D.S.	1,961	12.0	608
45011	Bydraulic S	ervo Cylinder	off	D.S.	141	12.0	8,481
36038	Aft Rotor D	rive Shaft	Cff	D.S.	3,030	10.4	340
14060	Drive Arm A	esambly - Trans.	Off	D.S.	1,493	6,0	403

	NT OFF-AIRCR AGE MIN-HOUR				
Component Code and Nomenclat	Cn/Off ure Acft.	Level	нтем	Avg Man- Hr	MH/FH x 105
22005 Engine	Off	D.S.	407	80.0	19,588
26019 Tail Rotor Gearbox	Off	۵.S.	1,867	24.0	1,284
15006 Tail Rotor Blade	Off	D.S.	63	16.0	25,513
45010 Main Rotor Servo Unit	off	D.s.	85	16.0	18,832
15016 Rotor Damper Assembly	Off	D.S.	1,042	16.0	1,541
24038 APP Clutch	oft	D.S.	1,563	16.0	1,027
57027 AFCS Servo Unit	OEF	D.S.	1,087	16.0	856
PP INCHES AND ADDRESS OF THE PROPERTY OF THE P	remonature de la companya de la comp			ALESPONOPHY CHASHR	THE PART OF THE PA
No. of the control of		ı		AND THE COMMENSATION OF TH	THE STATE OF THE S
Market Ma				A CONTRACTOR OF THE CONTRACTOR	N. Inches

APPENDIX IV

COMPONENT MAINTENANCE REQUIREMENTS

Tables XXXIV through XXXIX show the overall maintenance requirements of each of the six helicopter models as derived from analysis of field data. The criteria under which this data was developed and an explanation of the content and format of the tables can be found in the body of this report in the sections entitled Field Data Processing and Maintenance Requirements Analysis. The source of the data on each aircraft is as follows:

Model	Source
ОН-58 ОН-6 UH-1 АН-1	Navy TH-57A (3-M System) Army OH-6A (TAMMS) Marine Corps UH-1E (3-M System)
CH-47 CH-54	Marine Corps AH-1G, AH-1J (3-M System) Army CH-47 (TAMMS) Army CH-54A (TAMMS)

The data is as derived from the field records except that the average man-hours for component replacement has been adjusted, where necessary, to agree with the results of this analysis.

TABLE XXXIV.			Vent Helj			CE RI	EQUIRE	MENTS	5,	
ACTION REASON/FAILURE HODE	CN/ CFF A/C	L E V	ун/ У4 4VG	AVG •AC •EN	PA/ FH RATE	PA/ FH FCNT	PH/ FH RATE	PH/ FH PCNT	к-4· ИД/ FH	-N-K HH/ FH
1412B SWASH PLATE/SPRT	ASSY	~~~								
REPAIR 127 ADJST/ALIGN IMPROPEI 167 TORQUE INCORRECT 410 LACK OF/IMPROP LUBE 710 BRG FAILING/FALLTY 730 LOOSE	en R	D	3.4	1.6	16.3 3.1 3.5 1.0 1.7 2.8	75.8 14.5 16.1 4.9 5.0 12.9	54.6 12.5 8.5 1.7 4.9 11.3	70.6 16.1 10.9 2.3 6.3 14.6	1	1
REPLACE 135 BINDING/STUCK/JAHHEI 190 CRACKED 246 IMPROP/FAULTY PAINT OTHER COMPONENT TOTAL							21.5 2.6 1.5 7.9			2
14142 CYCLIC SERVE ACT					***					
CHECK 799 NO CEFÉCT	OH	0	1.3	1.4			12.1 12.1			3
REPAIR 029 CURRENT INCORRECT 127 ADJST/ALIGN IMPROPEI 135 BINDING/STUCK/JAMMEI 230 DIRTY 361 LEAKING-INTERM/EXTER	CN R D R	C	2.3	1-5	21.8 1.4 2.1 3.7 2.1 2.5 2.1	50.0 3.2 4.8 8.8 4.8 6.4	49.3 6.7 6.3 9.5 6.6 4.0 7.8	36.6 0.5 4.9 7.4 5.3 3.2 6.1	₽o4	1
REPLACE 381 LEAKING-INTERN/EXTE 803 NO-DEF/TIME CHANGE		~		1.6	12.5 8.3	28.6 19.1	31.2 13.1 7.0	24.4 10.2		2
OTHER COMPONENT TOTAL			2.5 2.9	1.6	0.0 43.7	0.0	35.0 127.6	27.4 100.0		

TAB	LE :	XXX	KIV -	Con	tinue	d				
ACTION REASON/FAILURE MODE	CFF A/C	Ê	YA AVG	. NC PEN			KH/ FH RATE			
14144 COLLECTIVE 'ERVO	AC T					# # 800 41				
REPAIR 070 BROXEN 127 ACJST/ALIGN IMPROPER 135 BINDING/STUCK/JAMMED 170 CORRODED 381 LEAKING-INTERN/EXTER 730 LODSE 803 NO-DEF/TIME CHANGE 818 WEATHER DAMAGE		0		* * * * *	0.3 0.7 0.3 0.7 0.3	4.6 9.1 4.6 9.1 4.6 13.7	7.1 0.2 1.7 0.2 0.3 0.3 1.7 2.6	1.0 10.6 1.0 1.7 2.1 10.2		
REPLACE 135 BINDING/STUCK/JAMMED 3B1 LEAKING-INTERN/EXTER 599 TRAVEL/EXT INCCARECT		C	2.7		1.0	13.6	4.7 1.9 1.7 1.1	10.3	2	Z
OTHER COMPONENT TOTAL		_	12.9	1.7 1.5	0.3 7.6	4.6 100.0	4.5 16.3	27.7 100.0		
15211 HAIN ROTOR HUB	*			 -			*************************************	******		
REPAIR 105 LOOSE/DAMAG HAPDWARE 127 ADJST/ALIGN IPPROPER 167 TORQUE JACORRECT 381 LE4KING-INTERN/EXTER			7.6	* *	1.7	5.2 5.2	225.8 1.6 27,3 13.6 165.7	0.5 9.1	1	1
REPLACE 803 NO-DEF/TIRE CHANGE	CH	D	7.4	2.2	2.1	6.2	15.4 13.3	5.1	2	2
OTHER COMPONENT TOTAL			42.1 9.0	2.1 2.3			58.5 299.7			A TOUR PERSONNEL PROPERTY OF THE PERSONNEL P

TAB	LE :	XXX	IV -	Cont	inued					
ACTION REASON/FOILLRE MODE	OFF A/C	E	₽4 AVG	NG PEN	FH Rate	FH PCNT	PH/ FH RATE	fh PC4T	PA/ FH	PH/
15114 HUB GRIP RESERVO	J R						.,			~=
REPAIR 381 LEAKING-INTERN/EXTE 410 LACK OF/IMPROP LUBE	OK R	C	1.5	1.9	124.1 51.6 55.1	94.0 39.1 41.7	181.9 125.0 32.7	81.7 57.5 14.7	*	1
REPLACE 801 NO-DEF/REMVD FCR HD	CN D	e	C.7	2.9	5.9 4.2	4.5 3.1	4.1 0.7	1.9	2	2
OTHER COMPONENT TOYAL			1.7	2.0	132.1	100.0	36.7 222.7	100.0		
15211 TAIL ROTOR HUB				·- •						
REPAIR 020 WORN.CHAFED.FRAYED 127 ADJ\$T/ALIGN IMPROPE 458 DUT SF BALANCE 730 LOOSE	CH R	0	1.6	* * *	13.9 0.7 2.1 1.4 8.3	75.5 3.8 11.3 7.5 45.3	22.6 0.5 1.7 7.6 10.7	50.6 1.2 3.8 17.1 23.9		1
REPLACE 020 WORN, CHAFED, FRAYED 730 LGOSE 803 NG-DEF/TIME CHANGE		D	5.4	\$	1.7 9.7	9.4 3.8	20.6 6.3 4.3 9.3	14.0 9.6	2	2
OTHER COMPONENT TOTAL			Z-1 2.4	0.8 1.3	0.7 18.4	3.8 100.0	1.4 44.6	3.3 100.0		
15215 TAIL ROTOR BLACE	:									
REPAIR 105 MISSING HARDWARE 117 DETERIORATED 127 ADJST/ALIGN IMPROPE 170 CORROCED 458 OUT OF BALANCE 730 LOOSE			1.8	# # #	1.7 2.1 2.7 1.0	9.1 10.9 3.6 5.4 7.3	2.9 6.9	2.6 4.7 1.4 9.9	1	Ź
REPLACE 020 WORN, CHAFED, FRAYED 105 LODSE/DAPAG HARDWAS 458 OUT OF BALANCE 710 ORG PAILING/FALLTY 730 LODSE 780 BENT, BUCKLED, ETC 601 NO-DEF/REMYD FER HE 803 NO-DEF/TIME CHANGE	₹€	Đ	4.4	***	0.7 0.7 1.4 0.7 1.4 1.0	3.63.65	3.0 5.7 3.0 6.3 3.9	2.6		growt.
OTHER COMPONENT TOTAL			10.8 3.3		0.3 19.1	3.1 0.001	6.4 63.0	10.1 100.0		

The state of the s	MPL	D 1	XXX	IV	- Co	ntin	ue 	:d 				
ACTION REASON/FAILLNE MODE	01 01 27	*/ *= *C	£ 5 ¥	74. 44.	/ AV(, 11 FH	/ TE	#4/ FH PCN/	Ph FH	/ 7+/ FH TE PC41	و. بو (جا	-1-1-8 1/ PF/ - FP
22500 Te3 E4GINE									 			
REPLACE 306 CONTAMINATION 372 METAL DV MAGNET PI 374 INTERNAL FAILL-E 803 NG-DE-/TIME CHANGE	.us :				*	Prod.	.7	6.3 6.3 41.2	34, 30, 27, 434.	.4 7.7 .0 4.3 .5 3.9	•	
CCMPONENT TOTAL			2	4. J 5. 4	2.0 2.1	6. 27.	6	23.8	92.	3 13.1		
REPAIR 108 BROKEN SETY WIRE/K 230 DIRTY 381 LEAKING-INTERN/EXT 730 LOOSE REPLACE 374 INTERNAL FAILLRE 381 LEAKING-INTERN/EXTERN	CV EY ER	D	: ;	2.3 2.8		9. 0. 1. 5. 0.	7 7 9 7 8 7 1	45.2 3.2 6.5 27.4 3.2 50.0	21.	9 36.5 2 2.0 7 3.2 5 22.4 7 1.1 50.2 3.3	2	2
OTHER COMPONENT TOTAL 22562 NATH RIFE CONTROL			7	. 7	1.3	1.6		4.2	200	70.7		
2754.2				. ? 	1.3	21.5	1	69-0	0.00	130.0		
REPAIR 127 ACUST/ALIGN IMPRIDE 381 LEAKING-INTERNYEAT.	24 24	C	1.	. 7	****	24.3 17.7 3.5		70.7 51.5	41.0 30.8	41.5		1
INSTALL REPLACE			*. •	. 3	1.2	0.7		2.0	8.8	9.0	3	3
REPLACE 177 FUEL FLOW INCORRECT 242 NO OPER,REAS UNKNOW 374 INTERVAL FAILURE OTHER COMPONENT TOTAL	1	IJ		. *	*	0.3 1.0 4.2	2	4.2 3.0 2.1	28.3 1.4 15.5	* 4 S	z	Mahari men in dili menormen dilikan di mero
and the state			2.	ğ		34.3	10	0.0	98.7	23.8 100.0		4-19-0-1 - POSERIOR - C-19-0-1

TA	BLE :	XXX 	.TV →	Con	tinue	â		 	··	
ACTION REASON/F1ILLRE MODE	04/ CFF 4/C	F 53 Y	PR/ PA AVG	AVG .AC .FEL	P4/ FH PATE	FI/ FH PCNI	PH/ FH AATE	97/ Fr PCMT	R-4 PA/ FH	
22563 GOYERSON							-		,	
127 ACUST/ALIGN IMPROPI 361 LEAKING-INTERN/EXT	R 2			\$. \$	2.1 6.2	57.4 11.1 33.3	3.6 14.1	9.1 29.9		
REPLACE 242 NO OPER,REAS CAKNON 374 INTERNAL FAILLRÉ	C4 Pi	D	3.0		7.5 6.2 0.7	40.7 33.3 3.7	22.9 16.9 2.1	48.6 36.0 4.4	ż	ijenst.
OTHER COMPONENT TOTAL	-						_	-		
22366 FUEL CHECK WALVE						<u>بلو ه ه</u> په و ټه د	**************************************	 .		• ···
037 FLUCTLATES/ERRATIC 108 BROXEN SFTY WIRE/KE 230 DIRTY 242 ND OPER.REAS UNSWOTH 246 IMPROP/FAULTY PAINT 315 RPM FLUCTUATION 730 LODSE 803 NO-DEF/TIME CHANGE	¥ ¥			· · · · · · · · · · · · · · · · · · ·	0.3 0.7 0.7 0.3 0.7 0.3	40.0 3.3 6.7 6.7 5.7 5.3 3.3 3.3	25482723 2010000	4.2.7.4.6.8		
REPLACE 037 FLUCTUATES/ERRATIC 070 BEGKEN 167 TORQUE INCORRECT 242 NO OPER.REAS UNENDI 374 INTERNAL FAILURE 803 NO-DEF/TIME CHANGE	C II			•	2.3	60.0 16.7 3.4 2.4 19.7 13.3 6.7	0.5	4.7 4.7 28.1 18.7	**	gerilli
COMPONENT-TOTAL			1.7	1-1	10.4	100.0	18.0	200.0		

Tabli	e X	VIXX	7 -	Cons	inue	đ				
										
	#/ FF /C	É	7	##5 #G #E#	Fil	PA/ FH PCNT		fH	#1 <i>/</i>	kde/
22572 LUSE FILTER										
REPAIR C 127 ADJST/ALIGN IMPROPER 306 CONTAMINATION 372 METAL ON MAGME: PLUG		G	2.5	1.2	100 and 100 an	80.7 12.9 25.8 29.0		88.7 7.3 22.5 27.5	gens g	
REPLACE O 308 CONTAMINATION 372 HETAL ON MAGNET PLUG 803 MO-DEF/TIME CHANGE		G	1.2	\$ 5	0.3 0.7	3.2 6.4	2.5 0.9 0.6	3.8 3.8	Ž	2
OTHER COMPONENT TOTAL			1.Z 2.3	1.1 1.2	0.0 8.01	0.0 100.0	0.3 24.5	1.1 100.0		
22593 !GNITION LEAD									70.00	
REPAIR O' 070 BROKEN 108 LGOSE/DAHAG HARDNARE 127 ADJST/ALIGY (MPROPER.	Y	C :	***	1.4	1.0 0.3 0.3 0.3	37.5 12.5 12.5 12.5		21.5 13.0 6.5 2.0	Z	Ē
	V.		1.7	2.4 0 * •	0.3 0.7	12.5 25.0	24 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 - 4 -	6.9 32.3 11.5	1	
SORPORT TOTAL		d design	L.7 L,9	0.5 1.2	0.9 7.\$	0.0 100.0	1.2	23.2		
Selli Ene to make delact	SHAF			·				~~~~		
REPAIR 381 LEAKING-INTERM/EXTER 804 NO-DEF/SCHED PAINT			. .0	1.3	\$.\$		105.8 27.1 69.7		*	
020 MR4, CPAPED, PRAYED 381 LEAKING-INTERN/EXTER 803 YO-DEF/TIPE CHAYGE		G 3	5-9	1.2 * *	1.0	17.5 3.1 3.1 9.3	23.0 5.6 1.8 12.0	3.9 3.4	Z	
OTHER COMPONENT TOTAL			. 3 . 2	1.3	0.T 31.&	Z-1 105.0	10.5 142.2	7.4 100.0		

		-	TAIV						 -	•
ACTION REASON/FAILURE MODE	C+ C+ 1/1	/ F C		/ 4V0 . AC G PEN	FA; FH BA;	/ FA/ FH TE PCAT		PF/ FH PCNT	R-4 M3/ F#	(-박~) (원왕 (Fir
ZEZIO RAIN XHSH ASSY								 		
201 FESTING-INIEGA/EX	er Er	- Page	3.	ê 1.6 *	9. 2. 5.	0 53.1 8 16.4 5 32.7	34.7 8.6 22.9	14.9 3.7 9.8	1	2
REPLACE 381 LEAKING-INTERN/EXT 603 MOODEF+TIME CHANGE 804 MO-DEF/SCHED RAINT				7.1 *	6. 2.	2 36.7 7 4.1 • 14.2 6 16.3	56.7 2.7	37.2		****
OTHER COMPONENT TOTAL			64.7 13.7			7 10.2 9 100.0			_	
SALL DATAE CORNTINE		~-=					*******			
170 CORROCED 246 IMPROP/FAULTY PAIN 437 IMPROP POSTNO/SLCT(730 LOOSE	C4		0.9	#	0.3 3.1 1.0	54.2 5.3 47.4 15.8 5.3	1.4 1.5	15.1	1	****
EPLACE 020 WORM, CHAFED, FRAYED 760 BENT, BUCKLED, ETC		Ō	C. 6	1+2 =	1-9 0.7	15.5 10.5 5.5	0.6 0.6		2	Z
OTHER COMPONENT TOTAL			1. 5	2.2 2.4 2.4	0.0 5.5	0.0 100.0				
6413 BEERING HANCER				T =			~~·			
EPAIR O # HDISY G70 WDMM,CHAFED,FR3YED 730 LODSE	C	ē	2.0	*	4.5 3.5	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	16-1 9-6	25.6 14.3	1	and a
PLACE O B MOISY OZO WORM.CHAFEO, FRANZO TIO BAG FAILING/FAILIY	C*	S	#**!\A #**!\A		4.5 2-1 9.7	17.1 7.5 2.5	12.5	20.1 3.6 3.9	2	2
C19 COMPONENT TOTAL			10.6 2.4	1.3	2.7 2.45	2.6 0.CG	6.9 62.9 1	11.0 N 3		

•	RLE	XX	XIV -	- Con	tinye	iđ 				
ACTION REASON/FAILURE ROSE	04/ CFF \/C		Pt./ F1 AVS	475 45 268	}4/ }H 84T£	PENT FIN	78/ *# *ATE	F=/ == F141	2-1 71/ Fh	
26-16 Tail POTOR (+48)						*				
RS: 1/R Bud CONTAMINATION 381 LEANING-INTERNIERT	Ci Eq	C	3.1	1.5	33.2 2.5 21.8	98.2 7.9 82.4	74.3 3.7 75.8	74.2 74.4 84.1	D-4D-	
S - 40-DEFAILINE CHANGE	Q±	Ç	4.7	# #	Ž., 10.	5.9 5.6	14.7 9.7	11.9 7.9	Ž.	616
SASIC SPANNENT TOTAL			5. ¢ 3. 5	1.5	1.7 35.0	4.9	13.8 122.6	11.2		
				*	3.1	14.3 90.0	4.5		general section of the section of th	
29411 DIL CEGLER			***			(42+) 	7.3	100.8	·	
REPAIR 190 CTACKED 230 EIRTY 246 IMPROP/FAULTY PAINT 381 LEAKING-INTERVEXTE 437 IMPROP POSITO/ALCTO 760 BENT, BUCKLES, FIC 947 TORN	-		1.0		*****		7.4 0.2 0.3 1.3 1.2 0.2 0.3 2.2	11.9	*	
374 INTERMAL FAILURE 381 LEARING-INTERNIERTE	3			***		50.7 32.1 3.6 3.6 21.4	22.4 24.5 2.5 2.6	Total Company of the company of the	- Henrik	Birth
CCMPONENT TOTAL			8.4 3.0	1.3].}	3.6 	2.9	15.2		

# 1.0 23.1 0.9 8.8 REPAIR	TA.	BLE	XXX	KIV	Con	tinue	đ			·	· · · · · · · · · · · · · · · · · · ·
### CHECK ON O O.8 1.7 1.0 23.1 U.9 8.8 3 REPAIR ON C 1.1 1.3 1.4 30.8 1.6 15.8 2 135 BINDING/STUCK/JAMMED * 0.7 15/4 1.0 10.5 230 DIRTY * 0.3 7.7 0.3 3.5 730 LOOSE CN O 2.2 1.8 2.1 46.1 4.6 46.4 1 0 8 NDISY * 0.3 7.7 1.4 14.0 0 8 NDISY * 0.3 7.7 1.4 14.0 0 8 NDISY * 0.3 7.7 1.4 14.0 0 8 NDISY * 0.3 7.7 1.4 14.0 0 8 NDISY * 0.3 7.7 1.4 14.0 0 8 NDISY * 0.3 7.7 0.2 2.2 242 NO OPER.REAS LNKNOWN * 1.4 30.8 3.0 30.2 GTHER COMPONENT TOTAL 2.2 1.7 4.5 102.0 9.9 100.0 #### COMPONENT TOTAL 2.2 1.7 4.5 102.0 9.9 100.0 #################################	REASON/FAILURE MODE	OFF A/C	Ē	PA AVG	λC γEΛ	FK RATE	FH PCNT	FH R'	FH PCNT	#4/ FH	PH/
### 1.0 23.1 0.9 8.8 REPAIR										~*==	~~~
730 LOOSE	CHECK 799 NO DEFECT	ON	0	0.8	1.7	1.0 1.0	23.1 23.1	U.9 0.9	8.8 8.8	3	3
DTHER 2.2 1.8 0.0 0.0 2.9 29.0	135 BINDING/STUCK/JAMME 230 DIRTY	ON D	С	1.1	7	1.4 0.7 0.3 0.3	30.8 15:4 7.7 7.7	1.6 1.0 2.3 6.2	15.8 10.5 3.5 1.8	2	2
### ### ### ### ### ### ### ### ### ##	REPLACE O 8 NOISY O20 WORN, CHAFED, FRAYED 242 NO OPF2, REAS LAKNOW	CN IN	0	2.2	1.8	2.1 0.3 0.3 1.4	46.1 7.7 7.7 30.8	4.6 1.4 0.2 3.0	46.4 14.0 2.2 30.2	į	I
### ### ### ### ### ### ### ### ### ##	OTHER COMPONENT TOTAL			2.2	1.8	0.0 4.5	0.0	2.,9 9.,9	29.0 100.0		
799 NO DEFECT		IR		4							
381 LEAKING-INTERN/EXTER	799 NO DEFECT				\$	5.9	5.0	13.3	6.5		3
242 NO OPER,REAS UNKNOWN	223 54		С	1.7	1.5 *					1	ı
OTHER 39.6 1.4 0.7 0.7 27.8 13.5 COMPONENT TOTAL 2.1 1.5 97.6 100.0 206.2 100.0	242 NO OPER, REAS UNKNOW 585 SHEARED	IN	c	2.0	‡ (.	12.8	13.1	31.5 13.9	15.3	2	2
	OTHER COMPONENT TOTAL			39°4 2•1	1.4	3.7 97.6	0.7 100.0	27.8 206.2	13.5 100.0		

TABLE XXXV.			NENT HELIC			CE R	EQUIRE	MENTS	š,	
ACTION REASON/FAILURE MODE	A/C	¥	AVG	PEN	RATE	PCNT	PH/ FH Rate	PCNT	FH	FH
14032 SWASHPLATE				*****						
020 WORN, CHAFED, FRAYED 170 CORRODED 803 NO-DEF/TIME CHANGE		D	7.2	*	3.6 1.4 3.3	29.9 12.0 27.9	16.3		1	1
800 NO-DEF/OTHER MAINT 799 NO DEFECT				*	8.C 6.9	5.5 2.8				
GTHER COMPONENT TOTAL			18.2 9.9	*****	3.0 11.9	24.8 100.0	53.8 118.4	45.4 100.0		
15003 HUB ASSY -TAIL R	OTOR									
					24.8	10.4	49.7	2.1	2	3
ADJUST 127 ADJST/ALIGN IMPROPE 458 OUT OF BALANCE 690 VIBRATION EXCESSIVE			4.2	*	7.0 3.3 1.5 1.3	2.9 1.4 0.6 0.8	29.1	1.2	4	4
REPAIR	ON	D	4.3		1.1	0.5	4.8	0.2	5	5
REPAIR 020 WORN, CHAFED, FRAYED 190 CRACKED 070 EROKEN		D	10.0	*	107.7 14.0 11.8 14.0	5.9 5.0	1077.3	45.0	1	1
REMOVE	CN	C	5.7		0.3	0.1	1.7	0.1	6	6
REPL=CE 190 CRAC=ED 070 BROKEN 799 NO DEFECT 020 WORN, CHAF2D- RAYED 800 ND-DEF/OTFE, MAINT 804 ND-DEF/SCHED MAINT			3.2	* * * * * *	4.4 1.3 1.6 4.1 1.4 1.0	1.9 0.6 0.7 1.7 0.6 0.4			3	2
OTHER COMPONENT TOTAL			15.8 10.1		73.2 237.5	30.8 100.0	1154.0 2391.4	48.3 100.0		

TAE	BLE :	XXX	(V - (Cont:	inued		· · · · · · · · · · · · · · · · · · ·		···········	** <u>***</u>
ACTION REASON/FAILURE MODE	CN/ GFF A/C	L E V	FH/ FA AVG	446 VC 467	FH RATE	PA/ FH PCNT	PH/ FH RATE	MH/ FH PCNT	R-A- MA/ FH	-N-K 44/ FH
15010 HUB #SSY-PAIN RO	70 709						<u>-</u>			
CHECK 799 NO DEFECT	CFF	G	2.0	ŧ	8.5 3.1	9.3 3.4	17-1	2.3	3	3
REPAIR 020 WORN.CHAFED.FRAYED 731 BATTLE DAMAGE		D	8.0	*		9-2	432.5	57.3	1	1
REPLACE 020 WORN, CHIFED, FRAYED	C٧	Đ	8.3	*	15-1 3-7	16.5 4.1	125~2	16.5	2	2
OTHER COMPONENT TOTAL		_	13.Z 8.3		13.7 91.4	15.0 100.0	180.6 756.4	23.9		
15047 DAMPER-MAIN ROTO	2		E - F - 4							~
REPLACE 374 INTERNAL FAILLRE 381 LEAKING-INTERN/EXTE 020 WORN, CHAPED, FRAYED 167 TORQUE INCORRECT 127 ADJST/ALIGN IMPROPE	R	С	1.2	* *	31.6 2.1 6.3 10.0 2.1 1.9	18.6 29.5 6.2	38.0	52.5	1	1
OTMER COMPONENT TOTAL			15.8 2.1		2.2 33.8	6.4 100.0	34.3 72.3	47.5 100.0		
15153 BLADE TAIL ROTGR			· 4 - 2 2 4 4 4				-			
TRUEDA TRUEDA TENEDA 149ROPE		0	2.0			6.8 6.8	0.6	6.6	2	Ź
REPAIR	CFF		1."		3.3	6.8	0.5	5.6	3	3
REPLACE 799 NO DEFECT 070 BROKEN 804 NO-DEF/SCHED MAINT 731 BATTLE DAMAGE 020 WORN, CHAFED, FRAYED 537 LOW POWER OR THAUST 730 LOUSE 780 BENT, BUCKLED, ETC 190 CRACKED 799 NO DEFECT	GN	D		*******	0.1 0.4 3.1 0.1 0.3 0.1 0.3 0.6	3.0 9.3 3.0 6.1 3.0 6.1 13.5 4.5	8.0		1	quel
OTHER COMPONENT TOTAL			0.1 2.1				0.1 9.2			

TAE	ELE	XXΣ	«V – 1	Cont	inued -		Rous - Man	enegalage esta a		
ACTION REASON/FAILURE MODE	CFF	Ε	۲A	۸C	/A/ FH RATE	fH	Fh	#H/ FH PCNT	4 4/	# = /
22007 ENGINE TURBINE										
CHECK	0 N	c	4C.8		0.4	0.3	16.3	1.0	ž	7
CHECK	CFF	Đ	3.0		ZZ.7	15.8	65.8	4.2	3	3
PAGENTAL POLITICAL SECTION 1810	0°:	0	2.6		10+5 6+1	7.3 4.2	27.9	1.7	5	5
REPAIR	ON	D	5.9		11.3	7.9	66.9	4.1	4	ā,
REPAIR 381 LEAKING-INTERN/EXTE 731 BATTLE DAMAGE	CFF R	Ð	1C.G	# #	5.9	4.6	721-1	44.3	1	2
REPOVE	CH	D	9.9		2-4	1.7	24.2	1.5	ŧ	6
INSTALL	CN:	Ō	8.3		1.6	1-1	13.0	0.8	7	8
REPLACE 020 WORN, CHAFED, FRAYED 070 BROKEN 142 ENG REM, EXCESS PAIN 190 CRACKED 230 DIRTY 304 UNIDENTIFIED BY COO 317 HOT START 374 INTERNAL FAILLPE 331 LEAKING-INTERNAETE 799 NO DEFECT 800 NO-DEF/OTHER PAINT 804 NC-DEF/SCHED PAINT	; E	C	14.5	*********	2.0 2.4 3.6 1.7 0.1 1.6 4.7 5.2 3.2	1.741112463 10.112463 13.433	858.3	52-7	2	1
COMPONENT TOTAL			16.C		18J.3	100.0	1796-5	100.0		

	CN/	L	FH/	AVG	F4/	74/	P F/	Ph/	R-A	-N-I
STION REASON/FAILURE MODE	CFF	£	PA	V.C	FH	FH	FH	FH	¥∆/	dh.
REASON/FAILURE POCE	_4/C 	¥ 	AVG	≯ Eħ	241E 	PChT	RATE	PCMT	FH 	43
22044 GOVERNOR POWER										
DJUST	CM	O	2.0		2.1	14.3	4.1	5.6	2	2
127 ACJST/ALIGN IMPROP	ê R				1-4	9.5				
EPLACE	C4	Đ	3.5		9.7	65.3	33.9	46.3	1	1
OZC WDRN, CHAFED, FRAYED				*						
037 FLUCTLATES/ERRATIC				*		5.9				
- 076 BROKEN - 136 BINDING/STUCK/JAMP	60			*	0.2					
374 INTERNAL FAILLRE	ະບ				2.6					
799 NC DEFECT				*		2.6				
900 NG-DEF/OTHER MAINT				*	0.3					
801 NO-DEF/REMVO FCR M				7	0.2	1.3				
803 MC-DEF/TIME CHANGE				*	1.8 3.3	12.3				
BO4 NO-DEF/SCHED MAINT				*	0.3	1.9				
OTHER							35.3			
COMPONENT TOTAL			5.0 		14.6	100.0	73.4	100.0		
2054 FUGL CONTROL										
CHECK	CFF	Q	1.0		4.7	18.1	4.7	3.6	2	2
ADJUST	ON	0	2.1		2.2	8.4	4.6	3.4	3	3
127 ADJST/ALIGH [MPROP					1.7					
EPLACE	CN	U	3.6		15.8	60.5	56.9	43,2	1	3
OZO WCKN. CHAFED. FRAYED					0.5	1.3				
037 FLUCTUATES/ERRATIC				*		4.4				
OTO BROKEH				*	0.6					
127 ACIST/ALICH IPPAGE						2.5				
177 FUEL FLOW INCORREC	-			2		1.1				
374 INTERNAL FAILLRE 803 MO-DEF/TIME CHANGE				\$ \$		20.8 2.9				
992 LONER POWER ELECTR					0.4					
OTHER			15.4		3.4	13.G	56.1	50.0		
CORPONENT TOTAL			5.1			100.C				

	TAB	LE 3	XXX	W - (Cont	inued					
ACTION	N/FAILURE PODE	CN/ CFF	L	rh / FA	∆vg ħc	FA/ FH	HA/ FH	РН/ FH	#;1/ FH	R-4 #4/	-k-K >>-/
REASO	N/FAILLRE MODE	A/C	٧	AVG	#EN	3148	PCNT	RATE	PCNT	F# 	F#
2206(COCLER ASSEMBLY-C						. ~				
REPAIR		CN	C	6.4		0.4	6.5	2.9	5.7	2	2
	ROKEN				#	0.1	1.3				
190 C											
REPLACE		CN	อ	5.1		5.2	91.8	31.8	65.1	1	1
020 H	UKH,CPAPEU,FKSYEU				*	U + 5	4.5				
	ROKEN				*		13.8				
	INDING/STUCK/Jammed)			*	~	4.5				
	RACK ED EAK ING- INTERN/EXTER	,			3	~ - ~	12.4				
	EAKING-INIEKN/EXIEN O DEFECT				*		24.9 4.7				
	O-DEF/OTHER MAINT										
	D-DEF/SCHEC MAINT					0.7 0.3	4.7				
o.	THER			119.0		J.1	1.8	14.3	29.2		
	THER OMPONENT TOTAL			7.2		6.8	100.0	48.9	103.0		
	FILTER ENGINE OIL			*					`~~~~		
REPLACE		ÇN	0	0.7		12.5	73.9	8.8	47.1	1	1
	ORM, CHAFED, FRAYED				*	0.5	2.9	8.3	_	-	
	ROKEN				*	Q.2	1.2				
	NIDENTIFIED BY CODE				*	1.1 3.3	6.5				
230 D	LATY O DEFECT				‡						
	u vereu: O-def/other paint						11.7 5.8				
	0-03F/SCHED MAINT				*	1.0 1.7	9.9				
0	THER OMPONENT TOTAL			2,2		4.4 17 A	26.1	. 9.9 18.6	52.9		
******		~~~				1/eU 	400±0	10+0	100.0		
	TRANSMISSION-MAIN										
CHECK		QFF	C	1.9		11.9	9.2	23.0	2.7	3	3
REPAIR		CFF	D	7.0		56.6	43.6	398.9	47.3	9	2
372 M	ETAL ON PAGNET PLUG	;	-		*	3.6	2.8			•	_
131 0	***LC D#F#65				*	7.1	5.5				
931 1	NADVERT OPER/RCLSE				*	9.3	7.1				
372 M	ETAL ON MAGNET PLUG	i	•		*	3.6 7.1	2.8	⇒ ∓ © € 7	₹642	•	

TALLE XXXV - Continued

	CV/	L	HH/	AVG	F 4/	MA/	2 H/	# }-#	2-4	-N-K
ACT LON	CFF	E	PA	, A.C	FH	FH	FH	FH	YA/	# H/
REASON/FAILURE MGDE			AVG				3 TA 9			Fн
REPLACE	CN	n	15.4		27.5	21.2	429.5	50.0	,	•
020 WORN, CHAFED, FP AYED		•	1292		2.6			244.	_	•
070 BROKEN				#	0.1	0.1				
306 CONTAMINATION				*	0.1	0.1				
330 EXCESSIVE HUM					0.1					
372 METAL ON MAGNET PLU	G			*	1.8	1.4				
374 INTERNAL FAILLAE					2.3 0.3	1.8				
464 OVERSPEED 799 NO CEFECT					2.9					
800 NO-DEF/DIHER MAINT										
603 NG-DEF/TIME CHANGE				*	2.2 4.4	3.4				
BO4 NO-CEF/SCHED MAINT				*	4.4 3.5	2.7				
OTHER			c.c				5.0			
COMPONENT TOTAL			6 - 6		129.8	100.0	851.4	100.0		
26017 TRANSHISSION-TAI	L ROI	CR					· 🕸 👊 🦓 🚥 38 A 4		` 	
CHECK	CFF	D	1.0		22.2	17.5	22.2	4.4	3	3
799 ND CEFECT		-				5.9				
REPAIR	OFF	D	4.0		51.3	40.4	206.4	40.6	1	2
381 LEAKING-INTERN/EXTE	3			#	11.9	9.3				
REPLACE	ON	0	6.7				232.4	45.7	2	1
CBYARRAGE CHAFED . FRAYED						5.6				
381 LEAKING-INTERN/EXTE	2				4.9					
799 NO DEFECT				# #	4.9	3.8				
800 NO-DEF/OTHER MAINT 803 NO-DEF/TIME CHANGE				¥	J•5	2.7 2.8				
BO4 NO-DEF/SCHED MAINT				\$	1.3	1.0				
OTHER			2.5		18.9	14.9	47.4	9.3		
COMPONENT TOTAL			4.0		127.1	130.0	508.5	100.9		

TA	BLE	XX)	KV -	Cont	inued				•••• <u>•</u>	
ACTION REASON/FAILURE MODE							#}/ FH RATE			
26019 URIVE SHAFT-MAIN	 I					,				
CHECK	CFF	D	1.0		23.3	29.8	23.3	10.0	1	2
REPLACE 320 WORN, CHAPED, FRAYED 799 NO DEFECT 170 CORRODED 500 NO-DEF/OTHER MAINT 804 NO-DEF/SCHED MAINT 935 SEORED OR SCR4 ICHED		Con Con	2.4	* * *	1.7 4.8 0.4 8.3	2.1 6.1 0.5 10.6 3.4	55.0	23.5	Z	append of
OTKÍR COMPONENT TOTAL			4.8 3.0		78.3	100.C	155.4 233.7	100.0		
25023 SHAFT-TAIL ROTOR	DRIV	Æ	~							
CHECK	CN	С	C.a		5.8	5.7	4.5	2.7	4	4
CHECK	OFF	Đ	1.0		20.3	19.8	20.3	9.7	2	3
REPAIR	GFF	0	2.0		47.2	45.9	93.2	44.5	1	1
REPLACE 020 WORN+CHAFEO,FRAYED 093 KISSING PART 731 BATTLE CAMAGE 500 UNIDENTIFIED 9: COD 585 SHEARED 780 BENT,BUCKLED,EIC 799 NO DEFECT 800 NO-DEF/OTHER MAINT 804 ND-DEF/SCHED MAINT	E	D	3,7	11 章 李 岳 孝 孝 孝	2.0 0.5 0.9 0.5 0.5 0.9 5.8 3.2	19.5 1.9 0.5 0.9 0.5 0.5 3.1		35.5	3	2
OTHER COMPONENT TOTAL			1.8				16.8 209.2			

TAI	BLE	XXX	ζV -	Cont	inued					
ACTION REASON/FAILURE MODE	CFF	E	PA	A.C	FH	ya/ fh PCNT	FH	FH	₩ # /	HH/
Z6126 SEAL BEARING REPLACE 381 LEAKING-INTERN/EXTER	CN R	0	3.7	*	4.9 3.8	100.0 78.4	18.1	113.1	1	1
OZO WORN, CHAFED, FRAYED COMPONENT TOTAL			***	*	0.7	13.5	18-1	190.0		
26187 FILTER-MAIN TRAN REPLACE 799 NO DEFECT 135 BINDING/STUCK/JAMMEN 020 WGRN, CHAFED, FRAYED 230 DIRTY 070 BROKEN 804 NG-DEF/SCHED M4INT	ON D	ē		*	1.2 0.8	3.8 30.3	6.0	104.7	1	1
OTHER COMPONENT TOTAL			C. 6 C. 9		0.5 6.5	5.2 100.0	5.9 6.0	0.0		
42355 STARTER GENERATOR REPLACE 374 INTERNAL FAILURE 020 WORN, CHAFED, FRAYED 900 BURNED OR OVERHEATE 080 BURNED OUT LOH! BULL 720 BRUSH FAILING/FORN 070 BROKEN	CN	0	1.2	*	0.8 0.9 0.9 0.8	5.1 5.1 5.1 4.5			1	1
OTHER COMPONENT TOTAL			Control of the contro		3.1 17.4	18.0 160.0	46.5 63.7	73.1 100.0		

TABLE	XXXVI.	COMP	ONENT	MAINTENANCE	REQUIREMENTS,
		UH-1	HELI	COPTER	
			-	——————————————————————————————————————	

ACTION	GA/ GFF	Ę	PH/ PA	∆VG AC	FA/ FH	PA/ FH	PH/ FH	7h/ Fh	R-A-	-K- 44
REASON/FAILURE PODE	∆/C 	٧	AVG 	7EN	RATE	PCKT 	RATE	PUNT 	₽# 	+H
14118 COLLECTIVE PITCH					~~~		****	, , , , , , , , , , , , , , , , , , ,		3
REPAIR 020 HORN,CHAFED,FRAYED 127 ACJST/ALIGN IMPROPE 660 STRIPPED	CH	c	1.9	1.3	15.7 8.9	50.3 28.5	30.3 18.4	47.0 28.5	1	1
127 ACUST/ALIGN IMPROPE	R			*	1.3	4.1	2.4 0.7	3.7		
730 LCOSE				*	2-1	5.7	5.3	8.2		
REMOVE 799 NO DEFECT	CN	G	2.5	1.4	2-1	6.7	5.3 5.3	8.3	4	4
799 NU SEFECT				•	2-1	0.1	ڊ• د	5+3		
NSTALL 799 NO DEFECT	GN	C	2.3	1.3	2,4 1.9	7.8 6.2	5.5 4.6	8.5 7.1	3	3
REPLACE	ON	G	2.1	1.4	7.8	24.9	16.3	25.3	2	
020 WGRN, CHAFED, FRAYED		•		ě	5.7	18.1	16.3 11.5	17.9		
OTHER COMPONENT TOTAL			2.2	1.2	3.Z 31.2	10.3	7.1 64.5	11.0		
4128 CYCLIC SWSH PLT/								. 4 4 4 4 4 4		
EPAIR	QN		3.4	1.5	21.3	46.7	73.4	33.3	1	,
127 ADJST/ALIGH II PROPE	R			*	7.0	15.2	28.6	13.0		
(EPAIR 127 ADJST/ÁLIGN IS PROPE REPLACE	R			*	7.0	15.2	28.6	13.0		
127 ADJST/ÁLIGN 15 PROPE EPLACE	GN GN	0	10.0	* 2.2 1.8	7.0 12.6 11.8	15.2 27.6 25.8	28.6 \26.1 21.1	13.0 57.2 9.6	2	
127 ADJST/ÁLIGN 11 PROPE REPLACE OTHER COMPONENT TOTAL	GN	0	1c.c 1.2 4.8	2.2 1.8 1.9	7.0 12.6 11.8 45.8	27.6 25.8 100.0	28.6 \26.1 21.1 220.6	13.0 57.2 9.6	2	
127 ADJST/ÁLIGN 16 PROPE REPLACE OTHER COMPONENT TOTAL	CN CN it val	0 .ve	10.0 1.2 4.8	2.2 1.8 1.9	7.0 12.6 11.8 45.8	27.6 25.8 100.0	28.6 \26.1 21-1 220.6	9.6 100.0	2	-
127 ADJST/ALIGN 16 PROPE REPLACE OTHER COMPONENT TOTAL 14141 PLT CHTRLCYL/COM REPAIR	GN GN iT VAL	0 .ve	10.0 1.2 4.8	2.2 1.8 1.9	7.0 12.6 11.8 45.8	27.6 25.8 100.0	28.6 \26.1 21.1 220.6	9.6 100.0	2	-
127 ADJST/ALIGN 16 PROPE SEPLACE OTHER COMPONENT TOTAL 14141 PLT CHTRLCYL/COM SEPAIR 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE	GN GN IT VAL CN IR	0 .ve	10.0 1.2 4.8	2.2 1.8 1.9	7.0 12.6 11.8 45.8 	25.8 100.0 32.9 7.8 5.1	28.6 126.1 21.1 220.6 208.7 57.8 30.1	9.6 100.0 26.9 7.4 3.9	2	
127 ADJST/ÁLIGN IS PROPE EPLACE OTHER COMPONENT TOTAL 4141 PLT CHTRLCYL/COM	GN GN IT VAL CN IR	0 .ve	10.0 1.2 4.8	2.2 1.8 1.9	7.0 12.6 11.8 45.8 	25.8 100.0 32.9 7.8 5.1	28.6 \26.1 21.1 220.6	9.6 100.0 26.9 7.4 3.9	2	
127 ADJST/ALIGN IS PROPE EPLACE OTHER COMPONENT TOTAL 4141 FLT CHTRLCYL/COM EPAIR 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE 710 8KG FAILING/FALLTY 730 LOOSE	GN GN IT VAL CN IR IR	O VE C	10.0 1.2 4.8 2.5	2.2 1.8 1.9	7.0 12.6 11.8 45.8 54.9 20.2 13.1 7.5	25.8 100.0 32.9 7.8 5.1 2.9 3.3	28.6 126.1 21.1 220.6 208.7 57.8 30.1	26.9 7.4 3.9 1.2	1	~ ~
127 ADJST/ALIGN IS PROPE EPLACE OTHER COMPONENT TOTAL 4141 FLT CHTRLCYL/COM EPAIR 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE 710 8KG FAILING/FALLTY 730 LOOSE	GN GN IT VAL CN IR IR	O VE C	10.0 1.2 4.8 2.5	2.2 1.8 1.9	7.0 12.6 11.8 45.8 64.9 20.2 13.1 7.5 8.4	25.8 100.0 32.9 7.8 5.1 2.9 3.3	28.6 126.1 21.1 220.6 208.7 57.8 30.1 9.5 36.1	13.0 57.2 9.6 100.0 26.9 7.4 3.9 1.2 4.6 7.0	1	** ***
127 ADJST/ALIGN IS PROPE EPLACE OTHER COMPONENT TOTAL 4141 PLT CHTRLCYL/COM EPAIR 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE 713 BKG FAILING/FALLTY 730 LOOSE INSTALL 799 NO DEFECT	GN GN GN GN GN GN	O VE C	10.0 1.2 4.8 2.5	2.2 1.8 1.9 1.8 *	7.0 12.6 11.8 45.8 64.9 20.2 13.1 7.5 8.4 12.9 12.5 73.9	25.8 100.0 32.9 7.8 5.1 2.9 3.3 5.6	28.6 126.1 21.1 220.6 208.7 57.8 30.1 9.5 36.1 54.3 53.2 280.6	13.0 57.2 9.6 100.0 26.9 7.4 3.9 1.2 4.6 7.0 5.8 36.1	1	-
127 ADJST/ALIGN IS PROPE EPLACE OTHER COMPONENT TOTAL 4141 PLT CMTRLCYL/COM EPAIR 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE 710 8KG FAILING/FAILTY 730 LOOSE INSTALL 799 NO DEFECT EPLACE 381 LEAKING-INTERN/EXTE	GN GN GN GN GN GN	O .VE C	1c.c 1.2 4.8 2.5	2.2 1.8 1.9	7.0 12.6 11.8 45.8 64.9 20.2 13.1 7.5 8.4 12.9 12.5 73.9	25.8 100.0 32.9 7.8 5.1 2.9 3.3 5.0 4.8	28.6 126.1 21.1 220.6 208.7 57.8 30.1 9.5 36.1 54.3 53.2 280.6 177.5	13.0 57.2 9.6 100.0 26.9 7.4 3.9 1.2 4.6 7.0 5.8 36.1 22.8	1	
127 ADJST/ALIGN 15 PROPE SEPLACE OTHER COMPONENT TOTAL 14141 PLT CHTRLCYL/COM REPAIR 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE 710 SKG FAILING/FALLTY 730 LOOSE (NSTALL 799 NO DEFECT	GN GN GN GN GN GN	O .VE C	10.0 1.2 4.8 2.5	2.2 1.8 1.9 1.8 **	7.0 12.6 11.8 45.8 54.9 20.2 13.1 7.5 8.4 12.9 12.5 73.9 41.2 8.9	25.8 200.0 32.9 7.8 5.1 2.9 3.3 5.0 4.8 25.6 16.0	28.6 126.1 21.1 220.6 208.7 57.8 30.1 9.5 36.1 54.3 53.2 280.6	13.0 57.2 9.6 100.0 26.9 7.4 3.9 1.2 4.6 7.0 5.8 35.1 22.8 3.4	1	

7A	BLE	XXX	VI -	Con	tinue	đ				
ACTION	CN/		rH./	4VG	Y 4/	73/	PF/	¥Ŀ/	R-A	-*-X
ACTION REASON/FAILURE MOCE	GFF A/C	Æ	ya Avg	AC F£N	FH QATS	FH	FH FH Bate	FH	4A/	4H/
							ne. C	ryn; 		rn
1911D SCISSORS/SLEEVE	4551								~	
REPAIR	CN	D	2.0	1.4	24.1	21.5	47.4	18.5	2	ż
020 WORN, CHAFED, FRAYED 127 ADJST/ALIGN IMPROPE	R			4	11.5	10.3	23.7	9.3		
REPLACE OZO WORN.CHAFED,FRAYED	CN	0	5 7	1.7	43.7	39.0	248.9	97.4	I	ė.
710 BRG FAI_ING/FALLTY 903 NO-DEF/TIME CHANGE				9	3.5	3.2	139.4	54,5 4.4		
903 NO-DEF/TIME CHANGE				*	4.4	3.9	139.4 11.2 67.9	26.6		
OTHER COMPONENT TOTAL			Ç. Ç	• -	44.1	39-5	0.0	0.J		
			Z.6	1.5 	111.9	103.0	296.2	100.0		-
15115 MAIN ROTOR HUB A					œ.					
REPAIR 020 WORN, CHAFED, FRAYED	OFF	Đ	17.8	2.0	14.4	14.9	255.1	30.7	2	2
710 BRG FAILING/FALLTY				*	3.2	3.4	83.5 123.7	10.0		
				_						
REPLACE 020 WORN, CHAFED, FRAYED	CN	Q	11.1	2.6	33.6	34.9	373.4	44.8	1	1
190 CRACKEC				_	4.4	4.5	67.2 5 <u>2.</u> 6	6.3		
710 BAS FAILING/FAULTY				#	3.6	3.7	42.9	5.Ž		
803 NO-DEF/:[RE CHANGE				\$	3.7	3.9	36.8	4.7		
OTHER			4.2	2.0	48.3	50.Z	203.5	24.4		
COMPONENT TOTAL							833.1			
15118 HAIN ROTOR CHT W										
REPAIR	GH.	0	2.0	1.5	3.6	62.5	7.2 0.5	72.5	1	1
070 BROKEN				*	0.5 A.3	8.6 5.7	0.5	4.9 * *		
127 ADJST/ALIGN IMPROPE	₹				0.8	14.3	0.8	8.2		
135 BINDING/STUCK/JARKE	Đ			*	0.3	5.7	0.2	1.7		
TIV CACK OF/ISPAUP COSE				*	0.3	5.7	0.1	1.0		
REPAIR 020 MORN.CHAFED,FRAYED 070 BROKEN 127 ADJST/ALIGN IMPROPE 135 BINDING/STUCK/JAMME 410 LACK OF/IMPROP LUBE REPLACE 020 MORY,CHAFED,FRAYED	Č4	0	1.4	1.6	1.1	20.0	1.6	16.0	2	ž
O70 BROKEN				*	0.Z 0.#	2.0 14.3	0.2 0.9	2.3		
730 LOOSE				*		2.9				
OTHER			1.2	1.2	1.0	17,1	1.1	11.5		
COMPONENT TOTAL			1.7	1.5	5.7	109.0	Ģ.Ģ	196.0		

TABLE XXXVI - Continued

4/ C	¥	AYG	FER	PATE	PAT FH PCNT	FH FH RATE	PCNT	#-2 V±/ FH	-4-3 HF/ FH
155Y	***			*****		******	. # 4:2 d da	~*	
CN	O	1.9	1.4	19.8	10.2	36.0	7.9	3	3
GFF	9	3.9	1.2	40.1 28.2	21.9 15.4	156.3 127.3	34.3 27.9	Z	Ž
Č	D	3.5	1.3 •	77,1 32.0 16.0	42.1 17.5 8.8	270.0 105.3 54.0	59.2 23.1 11.8	4	1
_		C.O Z.5	1.3	47.2 183.2	25-8 100.0	0.0 462.2	0.0 0.001		
			~						
Ĉ¥	0	0.8	1.2	13.4 13.4	13.2 13.2	purk Burk purk Burk A. S. S.	8.4 8.4	2	B
€N	Đ	1.1	1.2	11.5	11.4 11.4	######################################	9.9 9.9	3	2
SE			*	5.7.	5.1	21.0	15.7	1	Kuns
		C.C 2.5	30. ± Z	15.3 122.0	15.5	0.0 250.7	0.9 100.9		
ER			#	9.9 2.6	7.8 2.1	4.15 7.e	1.9 3.8	2	lask
	CN CN CN CN CN CN CN CN CN CN CN CN CN C	CN D CN D CN D CN D CN D CN D CN D CN D CN D CN D	CN D 3.7 CN D 3.7 CN D 3.7 CN D 3.7 CN D 3.7 CN D 3.7 CN D 3.7 CN D 3.7 CN D 3.7	CN D 1.9 1.4 GFF D 3.9 1.2 CN D 3.5 1.3 CN D 3.5 1.3 CN D 3.5 1.3 CN D 1.1 1.2 CN D 3.7 1.2 CN D 3.7 1.2 CN D 3.7 1.2 CN D 3.7 1.2 CN D 3.7 1.2	CN D 1.9 1.4 18.8 GFF D 3.9 1.2 40.1 28.2 CN D 3.5 1.3 77.1 32.0 6 16.0 C.0 47.2 Z.5 1.3 183.2 E ASSY CN D 0.8 1.2 13.4 6N D 1.1 1.2 11.6 6N D 3.7 1.2 61.1 GH D 3.7 1.2 61.1 GE 5.7 4.7 10.5 11.6 C.0 15.8 2.5 1.2 132.0 CN D 2.3 1.4 31.7 ER 9.9	CN D 1.9 1.4 18.8 10.2 GFF D 3.9 1.2 40.1 21.9 28.2 15.4 CN D 3.5 1.3 77.1 42.1 32.0 17.5 4 16.0 8.8 C.0 47.2 25.8 Z.5 1.3 123.2 100.0 E ASSY CN D 0.8 1.2 13.4 13.2 CN D 1.1 1.2 11.6 11.4 EM D 3.7 1.2 61.1 59.9 SE 5.7 5.1 4.7 4.6 10.5 10.3 15.8 15.5 2.5 1.2 122.0 132.0 ER P 7.8 2.A 2.1	CN D 1.9 1.4 18.8 10.2 36.0 GFF D 3.9 1.2 40.1 21.9 156.3 * 28.2 15.4 127.3 CN D 3.5 1.3 77.1 42.1 270.0 * 32.0 17.5 105.3 * 16.0 6.8 54.0 C.0 47.2 25.8 0.0 C.0 47.2 25.8 0.0 C.5 1.3 123.2 100.0 462.2 EASSY CN D 0.8 1.2 13.4 13.2 11.2 GN D 1.1 1.2 11.6 11.4 13.3 GN D 1.1 1.2 11.6 11.4 13.3 GN D 3.7 1.2 61.1 59.9 226.2 * 5.7 5.1 21.0 * 4.7 4.6 14.2 * 10.5 10.3 25.3 * 15.8 15.5 62.9 * 11.6 11.4 50.0 C.0 15.8 15.5 62.9 * 11.6 11.4 50.0 C.0 15.8 15.5 0.0 Z.5 1.2 122.0 123.0 250.7	CN D 1.9 1.4 18.8 10.2 36.0 7.9 GFF D 3.9 1.2 40.1 21.9 156.3 34.3	CN D 1.9 1.4 18.8 10.2 36.0 7.9 3 GFF D 3.9 1.2 40.1 21.9 156.3 34.3 2

TÀI)LE	XX	WI -	Con	tinue	â				
	** /	E	9H /	AYG	54/	¥4/	hu/	# #/	2-1-	- 能
action	OFF	Ē	PA	, NC	Fil	FH	PH/ F#	FF	## <i> </i>	W}/
REASCY/FAILURE MODE	AFC	¥	AVG	ナ を 宛	311£	FCNT	241E	PCNT	FH 	FH
REPAIR	ŒF	Ō	19.2	2.3	12-8	10-2	245.0	21.2	7	2
REPLACE	CH	O	42.2	2.4	35.6	25.3	1501.5	129.8	1	1
301 FOREIGN CEUCT CAPAG	E			*	5.6	2.3	163-7	14.1		
REPLACE 301 FOREIGH OBJET CAPAG 317 HOT START 804 NO-DEF/SCHED MAINT				*	3.7 6.7	3.V 3.7	135-1 231-2	25.5		
				•	4.5		LJESC	24.44		
OTHER CORFCHENT TOTAL				2.3	125.6	100.0	C.0 C.8[8]	0.0 0.001		
22261 FUEL REGULATOR	·				4-\$4- 01			•		
i Repair	C*ŧ	Ō	1.5	1.5	70.4	62.4	31.5	34 <u>-</u> 9	9	2
127 AÜJST/ALIGN IMPROPE 537 LOW POWER OR THRUST	R	-			13.1	40.1	11.3 2.3	13.2		
537 LOW POWER OR THRUST				₹	2.6	7.9	2.3	2.7		
instali.	ÖN	0	7.2	1.5	0.5	5.0	4.7	5.5	3	3
REPLACE	04	G	7.8	1.7	5.3	16.3	41.6	45.8	Ž	1
242 MD OPER REAS LAKNOW 381 LEAKING-INTERN/EXTE	4			幸	1.3	4.0	13.7	16.0		
381 LEAK ING-INTERN/EXTE	Ž.			*	1.0	3.0	9.7	11.4		
i ÖTHER			1.2	1.6	6.3	19.3	7.5	8.9		
OTHER COMPONENT TOTAL			2.6	1.6	32-7	100.0	35c4	100.0		_
22262 MAIN FUEL PANIFO	LD									~
	Q*	G	3.0	1.5	4.2	59.0	12.4	35.7	94	2
127 ADJST/ALIGN IFPROPE	*	_		*	0.3	4.5	0.2	9.5		_
127 ADJSTVALIGN IMPROPE 381 LEAKING-INTERM/EXTE	ą			*	1.9	27.3	7.5 0.4	20.9		
730 LOOSE				7	7.5	7.1	V-4	1+4		
alpair	CFF	Ō	17.2	2.0	0.2	2.2	2.5	7.7	f.A.	4
REPLACE	CM	C	5.5	2.1	2.4	34.1	13.4	37.3	Ž	1
i jei previkalaisza szels	¥		•	*	L÷T	€1.3	797	- £440		
OTHER			22.0	2.0	0.3	4.6	7.3	20.3		
OTHER COMPONENT TOTAL			5.0	1.8	7.1	100.0	15.8	133.5		

TABLE XXXVI - Continued

ACTION REASON/FAIL-AE MODE	CF.F A/C	Ę	746 746	nc Per	fh #475	PENT	fn 85T E	FH	F .1	77.7
22263 START FUEL SOL VI	LVE		****	*************************************		rapadora desg	. 			
REPAIR 135 BINDING/STUEK/JAMPEL 374 INTERNAL FAILURE 381 LEARING-INTERN/EXTER 450 OPEN 901 INTERNITIENT				*	0.5 0.5 0.5	46./ 8. 11.2 6.7 6.7 4.4		10.5 14.2 4.6 12.5	****	- Westernamen
POI INTERMITTENT REMOVE 799 NO DEFECT	為	0	Q, č	***	1.1 1.1	15.5 15.5	5.7 5.7	9.0 9.0	Ž	1
799 NO BEFECT	CN			*	1.1	15.5 15.5	9.4	7.9		
REPLACE 242 NO OPER, REAS UNLIGHT	ÖK	0	2.5	2.4 ≢	0.6 0.5	8.9 6.7		21.0 19.3	4	Ž
OTHER COMPONENT TOTAL			0.9 1.1	1.7 1.5	1.0 7.3	13.3 100.0	0.0 7.0	11.0 100.0		
2226310 STARTING FLEL MO	LILE									
REPAIR 109 UNIDENTIFIED BY CODE 177 FUEL FLOW INCORRECT				幸	0.Z 0.3	9.91 1.6 4.51	0.1 2.3	1.0 21.1		Ź
REPLACE 070 BAOKEN 177 FUEL FLOW INCORRECT 190 CANCKED 230 DIRTY 242 MO OPER, REAS UNKNOWN 277 FUEL MODULEGKING 314 SLOW ACCELERATION 01PER COMPONENT YOTAL				* * * *	0.Z 0.Z 0.3 0.Z 0.3 0.2	5,3 5,3 12,5 5,3 12,5			***************************************	1
Anna Anicai - 1814			2 a 🚘	1.40	ۥ0	494.V	≣≥∰	197.3		

TA:	BLE	xxx	VI -	Cont	inue	đ	41.5			الله الرحو شر
ACTION REASON/FAILLRE MODE	UFF	E	MA	AE	FH	PA/ FH PCNT	FH.	FF	MA!	~⊬ /
22291 EXCITER UNIT								• • • • • • • •		
CHECK	CN	C	9.2	3.4	3.5	6.3	4.5	26.3	4	1
REPAIR 374 INTERNAL FAILURE 958 INCORRECT DISPLAY	LN	0	1.7	1.6 *	2.1 1.0 3.3	27.1 12.5 4.2	3.5 1.6 0.5	20.7 9.6 2.9	1	3
						14.6 14.6				4
REPLACE OTO BROKEN 242 NO OPER, REAS LAKNON 255 NO OUTPLT 374 INTERNAL FAILURE				*	0.5	27.1 4.2 6.3 4.2 6.3	0.5	3.2	2	2
OTHER COMPONENT TOTAL			2.2	1.6	7.8	25.0 10(.0	16.8	23.5 100.0		
22293 IGNITER PLUG										
REPAIR 020 WORN, CHAFED, FRAYED 106 HISSING HARDWARE 108 BROKEN SFTY WIRE/KE 127 ADJST/ALIGN IMPROPE 190 CRACKED 230 DIRTY 242 NO OPER.REAS LAKNOW 255 NO OUTPUT 602 FAIL DUE ASSOC EQUI 615 SHORTED 730 LOUSE 900 BURNED GR OVERHEATE	ם		•	* *	3.2 3.2 3.2	3.5 3.5 3.5	0.0 0.4 0.3	0.3 2.3 1.8		444
REPLACE 070 BROKEN 117 DETEXIORATEC 242 NO OPER.REAS UNKNOW 255 NO DUTPUT 314 SLOW ACCELERATION 317 HOT START 334 TEMPERATURE INCORRO 900 BURNEO OR OVERHEATE	IN T	C	1.8	4 * * * * * * * *	0.2 0.5 0.2 0.2 0.2	10.7 3.6	0.1 9.2 1.3 0.3 0.4 0.2	0.7 1.0		Z
OTHER COMPONENT TOTAL			12.7 3.9	1.4	9.5 4.5	10.8 100.0	6.2 17.7	35.? 190.0		

TA!	BLE	XX	XVI -	Con	tinue	đ				
ACTION REASON/F4ILLMc MODE	OY/ OFF A/C	L E V	PH/ PΔ AVG	AVG AC MEN	FA/ FH RATE	PA/ FH PCNT	##/ f+ rate	PF/ FH PCNT	R-4 24/ Fl:	-h-K yr/ fh
26111 MAIN CRIVE SHAFT			~~~~ <u>~</u>		#±					
REPAIR	CN	C	3.2	1.9	5.5	8.2	17.8	8.5	3	3
REPAIR 381 LEAKING-INTERN/EXTER 410 LACK OF/IMPROP LUBE 804 NO-DEF/SCHED MAINT	CFF R	9	3.7	1.3	11.5 4.2 1.8 1.8	17.1 0.3 2.7 2.7	42.5 15.4 3.9 6.2	20.4 7.4 1.9 3.0	2	2
REPLACE 020 HORN+CHAFED,FRAYED 381 LEAKING-INTEPN/EXTER 500 NG-DEF/OTHER MAINT 804 NO-DEF/SCHED HAINT	0N R	C		*	11.0	16.4 6.3	99.6 36.6 9.0 4.9 20.6	17.5	1	1
OTHER COMPONENT TOTAL										
26211 HAIN TRANS ASSY	CN R	9					269.1 12.8 38.8	107.8 7.5 15.5 6.5 55.2	1	**************************************
03 NO-DEF/TIME CHANGE OTHER COMPONENT TOTAL										
2621C MAST ASSY							*****	******		
REPAIR 020 WORN, CHAFED, FRAYED 167 TORQUE INCORRECT 170 CORRODED 730 LOOSE		9	1.4	*	1.0 0.6 1.1	3.9 2.6 4.5	9.8 2.1 0.4 0.8 3.6	0.5	2	2
INSTALL 799 NO DEFECT	ON	D	2.9	1.7	1.0	3.9 3.9	8.7 8.7	5.1 5.1	3	3
REPLACE 020 WORN, CHAFED, FRAYED 381 LEAKING-INTERNIEXTER 803 NO-DEFITIME CHANGE		D	10.3	2.4 * *	2.6	10.3 3.9	109.9 11.8 12.6 53.1	7.0 7.5	a mag	1
OTHER COMPONENT TOTAL			6.3 5.7	2.5 2.3	6.5 25.1	25.8 100.0	40.8 169.2	24.1 100.3		

TABLE XXXVI - Continued

	CN/	L	⊁ н/	AVG	FA/	PA/	# #/	# + /	R-A	-N-K
ACTION REASON/FAILURE MODE										
2621E MAIN INPUT CUILL										ی ست د
REPAIR 020 HORN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTE	GN R	D	5.0	1.7	8.1 0.8 6.0	28.7 2.9 21.3	40.6 2.6 33.5	32.0 2.1 26.4	2	2
REPLACE 381 LEAKING-INTERN/EXTE	ON R	0	7.3	1.5	11.0 9.5	39.1 33.9	80-3 74.0	63.3 58.4	1	1
OTHER COMPONENT TOTAL							5.9 126.8			
2621J TUBING										
REPAIR 070 BROKEN 127 ACJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTER 730 LOOSE 780 BENT. SUCKLED, ETC	R	C	1.9	# \$	0.2 1.5 0.3	3.2 29.1 6.5	2.5 0.2 0.1 1.8 0.2 0.2	1.6 37.1 4.9	1	,400 4
REMOVE 799 NO DEFECT	GN	0	C. 7	1.0	0.6 0.6	C.E1 0.E1	0.4	9.2 9.2	3	3
INSTALL 093 MISSING PART 799 NO DEFECT	CH	C	C. 7	1.0 *	0.5 0.2 0.3	9.8 3.3 6.5	0.3 0.2 0.2	6.6 3.3 3.3	4	4
REPLACE D20 WORN, CHAFED, FRAYED 190 CRACKED 381 LEAKING-INTERN/EXTER 720 BRUSH FAILING/FORN 780 BENT, BUCKLED, ETC	R			*	0.5 0.2 0.2	9.; 3.2 3.2	0.6 0.5 0.2 0.2 0.1	11.7 10.3	2	Z
OTHER COMPONENT TOTAL			C.5	0.9	0.3 5.0	6.2 103.9	0-1 4-9	3.1		

TAI	BLE	XXX 	VI -	Con	tinue	d ———		······································		
ACTION REASON/FAILURE MODE	OFF A/C	E		NC.	FH	#2/ FH PCNT	FН	fH	94.6 /	×H.
SPSJK HOZE										
REPAIR 020 WORN, CH4FED, FRATED 106 MISSING HARDNARE 127 ADJST/4LIGN INPROPE 331 LEAKING-INTERN/SXTE 437 IMPROP POSTND/SLCTD 730 LOOSE	R	С	1.2	***	0.3 0.5 0.6 0.6	45.5 6.1 9.1 12.1 12.1 3.0 3.0	0.4 0.8 0.7 9.6 0.3	\$.1 11.7 10.2	gastii.	5
REMOVE 799 NO DEFECT	î#	C	C.6	1.0		12.2		5.9 5.9	4	Ą
INSTALL 797 NO DE ECT	Q₩	S	6.5	1.0		15.2 15.2			3	3
REPLACE O20 WORN.CHAPED.FRAYED O70 BROKEN 780 BENT.BLCKLED.ETC	(* <u>%</u>	G	1.7	1,4 * *	1.0	_	2.1 0.3	32.1 4.3	1	2
OTHER COMPONENT TOTAL		· ******			0.0 5.3	6.0 100.0	3.4 8.6	4.6 100.C	****	
26411 TAIL DRIVE SHAFT	ASSY	7								
REPAIR 020 WORN,CHAFED.FR1YED 127 ADJST/ALIGN 14940PE 780 BENT,HUCKLED.EIC		0	1.5	1.3	2.6	33.9 13.9 2.6 7.0	4.3 0.4		2	2
REPLACE OZO HORN, CHAFED. FRAYED 731 BATTLE CAMAGE 780 BENT, BLCKLED, ETC ROO NO-DEF/OTHER MAINT 935 SCORED OR SCRATCHED		С	1.7	1.3	2.) C.6 1.0 O.8		4.5 1.6 1.6	15.6 3.3 5.4 3.4	45.11 · · · · · · · · · · · · · · · · · ·	∳ud∳.
PATOT T. BACGMOD			1.4	1.3	2.9	15.6 160.0	4.) 29.7	12.5 190.8		

TAI	BLE	XXX	VI -	Con	tinue	đ				
REASON/FAILLRE MODE	A/C	¥	PH/ PA AYG	FER	PA/ FK Bate	FA/ FH PCNT	/H/ FH RATE	ун/ Fh РСЧТ	R-A WA/ FH	-X-X #+/ FH
26413 HANGER ASSY						. **********	*******	*****		
REPAIR 020 WGRH, CHAFED, FRAYED	C4	C	2,6	1.2	7.6 1.8	13.9 3.2	20.1 3.3	17.0 2.8	3	3
REPAIR 020 WIRM, CHAFED, FRAYED 710 ERG FAIL ING/FALLTY		G	2.5	1.2	1.5	20.1 2.6 15.0		23.0 2.6 15-9	?	2
REPLACE 020 KORN, CHÁFED, FRAYED 381 LEAKING-INTERN/EXIS 710 BRG FAILING/FALLTY	₹		2.0	*	16.8 2.3	50.7 4.1	56.9 29.9 3.9 13.3	25.3 3.3	gara gi	· ·
CTHER COMPONENT TOTAL			1. <i>8</i> 2.2	1.0 1.2	6,5 54.8	12.4	12.3 118.4	10.3 100.0		
264]4 JVI. GEAR BCX	*				# 64 m 10 m, 15 m		****		· ~== +	
REPAIR OYO BREXEN 230 DIRTY 381 LEANING-INSERM/EXTE		c	ì. ö	e e	2.4	4,4 9.5	13.5 1.5 1.0 2.3	1-8 3.6	**************************************	2
REPLACE OSC HOLN, CHIFFO, FRAYEO 381 LEAKING-INTERN/EXTE BAYLOD 3417/140-UH EOS	CX R	Ğ	3.1	1.5	4.2	, 9.5	50.1 7.1 12.1 10.5	15.1	rigiosit.	i i
other Compagnet total			1.5	1.5	14.7 66.5	35.l 106.0	\$6.8 4004	20.9 100.5	_	
266-5 TAIL GEAR SCI	ru, mak d		f = =+-							
REPAIR 020 JRN.CHOFED.FRAYEC 070 BPHRFN 230 FIRTY 306 CONTAHIRATION 361 LEARLYC-INTERXIEXIE		ū	1.6	1.3	2+4 3.7	2.7 2.2 2.2		1.÷ 1.÷ 2.¢	;	- Agent
EMSTILL T HO DEFECT	Ç*	C	2.7	1.4 e			15.6 15.3		Çer.	de.
REI .C. CRM, CHAFFU, FRIYED 30 COTTANTW TION 381 LEARING-TUTEON/ARTC 603 NO-SEFF/: IMC CH-VGE 916 IMERIKE FALL/SIL ANK		٤	e, Ç	1.7 2.7 2.7 4.4 4.5	2.3 2.9 6.9	2.5	14.5	4.5 6.7 12.4 5.1	ξ	growth.
COMPONENT TOTAL			1.5 2.0	1.5	26-2 24-6	24.9 100.0	42.0 9.165	18.1		

T7	BLE	XXX	KVI ~	Con	tinue	_	**	.aa.⊌	ng diplom o	
ACTION REASON/FAILURE POSE	CFF △/C	ξ	YA Ayg	nc Men	FH Rate		fh Rate	FH PCNT	FL/ Fh	MH/ FH
29132 PILLOW BLK 4SSY										
REPAIR 020 WORN, CHAFED, FRAYED 710 ERG FAILING/FLLIY 730 LODSE		Ð	1.3	1.2	1.3	68.4 42.1 10.5 15.8	1.2	64.9 29.1 28.0 7.8	1	1
REPLACE 020 WORN, CHAFED, FR: YED	CN	D	1-3	1.0	0.8 9.8	26.4 26.4	1.0 1.0	25.2 25.2	2	Z
OTHER COMPONENT TOTAL			2.6 1.4	1.2	3.1	5.2 100.0	4.2	9.9 103.0		
2923E PARTICLE SEPARAT							,,			
REPAIR JOO BROKEN 106 MISSING HARDWARE 190 CRACKED 230 DINTY 540 PUNCTURED 780 BENT, BUCKLED, ETC		С	1.5	*******	0.8 0.5 0.8	76.3 13.1 7.9 13.1 13.1 5.3	2.9 0.3 1.0 0.6	29.8 4.6 9.9 5.8	1	1
REPLACE 117 DETERIORATE(540 PUNCTURED 947 TORN	CN	C	1.8	0.1 * *	0.3 0.2	13.2 5.3 2.6 5.3	0.7 0.2	7.4	2	2
OTHER COMPONENT TOTAL						10.6 100.0				
2931J DROOP COMP CAME										
REPAIR 020 WORN,CHAFED,FRAYED 127 AGUST/ALIGN IMPROPE 315 RPM FLUCTUATION	3	C	1.3	*	1.1 13.9	73.6 4.4 54.1 5.7	1.7 19.7	54-2 3.7 44.0 2.6	Q prodi	1
REPLACÉ G20 WORN.CH4FED.FRAYED	C٧	9	2.4	1.4	3.1 1.0	11.9 3.8	7.4 2.4	16.5 5.3	2	Z
OTHER COMPONENT TOTAL			3.5	1.2	3.7	14.5	13:1			

TABI	JE X	ΚXX	VI -	Con	tinue	d				
	nee	=	# 4		εu	Eu	MH/ FH Rate	E	53 5 7	115. 3
#										
2931J10 LINEAR ACTUSTOR										
CHECK 799 NO DEFECT				奉	3.1	5.1	2.5	2.7		4
REPAIR O70 BROKEN 127 ADJST/ALIGN 1MPROPER	ŌΝ	G	i.1	1.3	26.2 1.8 13.1	43.3 2.9 21.7	28.G 1.8 14.7	30.3 2.0 15.9	1	2
REPAIR 453 OPEN	QFF	D	2.0	1.3	6.5 1.6	10.7 2.7	12.7 3.4	13.7 3.7	3	3
REPLACE 135 BINDING/STUCK/JAMMED 242 NO OPER,REAS LNKNOWN			2.1	1.2 *	14.7 2.6 5.5	24.3 4.3 9.1	30.9 5.3 :1.4	33.5 5.8 12.4	ż	1
OTHER Component Total			1.6 1.5	1.1 1.2	9.7 60.5	16.0 100.3	15.1 92.2	16.4		
29321 RPM WARN LMT DET/	60X			***	*******		a-a-a-			
REPAIR 127 ADJST/ALIGN IMPROPER	QN	С	1.5	1.4	32.3 22.5	19.1 13.4	47.4 26:3	13.9 7.7	3	3
REPAIR 127 ADJSY/ALIGN IMPROPER 615 SHORTED	CFF	0	1.6	1.2 *	33.5	19.6	100.0 43.0 20.0	12.6	2	Ž
REPLACE 374 INTERNAL FAILLRE 901 INTERMITTENT 958 INCORRECT DISPLAY	CN	C	2.4	*	30.1 12.5	17.5 7.4	140.5 66.7 39.8 11.1	17.5 11.6	1	ī
OTHER COMPONENT TOTAL			2.4 2.C	1.Z 1.4	22.5 167.1	13.3	53.8 341.8	15.8 100.0		
29421 OIL TANK				-+		·			***	
REPAIR OTO BROKEN 106 MISSING HARDWARE 190 CRACKEC 381 LEAKING-INTER*/EXTER 410 LACK CF/IMPROP LUSE 730 LOUSE) N	C	great # d	1.2 * * * * *	0.5 3.3 0.5 2.1 9.3	4.0 26.0	0.2 0.2 0.2	2.2 27.5 0.9	1	****

TA	. Zut	AAA		CON	tinue ———	a		······································	- (2-4 7-7	
ACTION REASON/FAILURE MCCE	GN/ CFP		PH/ PA	AVG AC	84/ FH	PA/ FH	FH/ FH	MH/ FH	R-A MA/	-N-K µu/
					*41E	*\N! 	na;e 	<i>F</i> in:		
REPOVE	nu	r	2 5	1 4	2.5	4.1	1 2	11 1	3	3
799 NO DEFECT	5.4	·	243	*	0.3	6.1 5.0	0.6	5.2	-	-
REPLACE	0N	G	2.1	1.2	1.6	20-0	3.4	31.1	2	2
020 WORN, CHAFED, FRAYED				#	0.3	4.0 4.0	0.4	3.8		
070 BROKEY				*	0.3	4.0	0.5	5.0		
127 ADJST/ALIGN IPPROPE	R				2.2	2-0	1.5	13.4		
381 LEAKING-INTERN/EXTE					0.3	2.0 4.0 4.0	0.5	4.5		
800 NO-DEF/OTHER PAINT				*	G.3	4-0	0.2	Z+2		
OTHER COMPONENT TOTAL			1.9	1-4	1.1	14.0	1-1	10 ~4		
COMPONENT TOTAL			1.3	1.2	B+1	100.0	10.9	100.0		
29422 OIL COOLER										
REPAIR	C٨	G	1-6	1.4	4.2	37.6	6.8	23.2	1	2
OZO WORN, CHAFED, FRAYED					0.6	5.8	1.5	5.1	-	
ろうろ ロカバッとい					0.5	5.8	0.4	1.3		
190 CRACKED				•	0.3	2.9	0.5	1.7		
381 LEAKING-INTERN/EXTE				*	1.1	5.8 5.8 2.9 10.1	1.3	4.4		
INSTALL	ON	C	2.6	1.0	0.6	5,8	1.7	5.8	3	3
093 MISSING PART					0.2	1.5	0.1	0,4		
799 NO DEFECT				*	0.5	4.4	1.6	5.3		
REPLACE	ON	G	3. I	1.3	3.2	28.9 5.8	10.0	34.0	2	1
OZO WORN.CHAFED.FRAYED				*	0.6	5.8	1.1	3.9		
970 BROKEN 306 CCHTAMINATION					0.3	2.9 4.3	0.3	0.9		
710 BRG FAILING/FALLTY					0.5	4.3	3.9	13.3		
800 NG-DEF/OTHER MAINT				*	0.5	4.3 2.9	1.0	3.3		
dod wo-octivings makes				•	U+3	2.7	1-7	7+1		
OTHER COMPONENT TOTAL			3.5 2.6	1.3	3.1	27.6 100.0	10.9 29.4	37.0		
	~ #= # =							****	***	
29621 TAIL PIPE										
REPAIR	_	Đ	1.0	1.7		26.4			2	3
127 AGUST/ALIGN IMPROPE	₹			*		5.3		7.8		
190 CRACKED				3		15.5		10-2		
799 NO DEFECT				*	0.2	5.3	0-0	1.2		
REPAIR	ÇFF	9	3.1		9.3	10.4		24.1	3	2
190 CRAUKEC				4	0.3	10.4	1.0	24.1		

TA	BLE	XXX	VI -	Con	tinue	d				
ACTION REASON/FAILURE MODE	GN/ GFF A/C	L E Y	PH/ PA AVG	AVG AQ YEN	PA/ FH PATE	PA/ FH PCKT	XH/ FH RATE	HH/ FH PCNT	R-A MA/ FH	-N-K HH/ FH
REPLACE 190 CRACKED 731 BATTLE DAMAGE 780 BENT, BLCKLED, ETC 932 LOCKS/UNLOCKS INCOME				1.6	0.6 0.2	21.0 5.3	3.5 2.3 0.3 0.3	56.8 7.1	1	*
OTHER COMPONENT TOTAL			C. 0 1. 7	1.6	0.8 3.1	26.4 100.0	9.0 5.3	0.0		
42111 AC GENERATOR										
CHECK 799 NO DEFECT	ON	0	3-2	2.4	5.2 4.7	12-1 10-9	16.5 3.4	12-0 2.5	3	3
REPAIR 070 BROKEN	0H	Û	2.1	1-7	8.3 2.3	19.3 5.3	17.3 4.3	12.6	2	2
REMOVE 799 NO DEFECT	CN	0	1.9	1.4	4.7 4.7	10.9 10.9	8.7 8.7	6.3 6.3	5	5
INSTALL 799 NO DEFECT	CN	O	2.4	1.4	5.2 5.2	12.1 12.1	12.6 12.6	9.2 9.2	4	4
REPLACE 169 INCORRECT VOLTAGE 374 INTERNAL FAILURE 800 NO-DEF/OTHER MAINT	ON.	Ġ	2.7	*	1.3 4.4	3.0 10.2	31.4 5.5 10.3 6.8	4.6 7.5	1	1
OTHER COMPONENT TOTAL			6.4 3.2	2.1 1.8	7.9 42.8		51.0 137.7			
42211 STARTER GENERATO	2									
CHECK 799 NO DEFECT		Ģ	3.4	1.5	3.7 2.9	13.; 10.3	12.6	E-Ei 6.6	3	3
REPAIR 070 GROKEN 730 LOGSE	CN	0	2.0	1.8	0.8	2.8	15.2 0.7 1.1	0./	Z	2
REPLACE 374 INTERNAL FAILURE 800 NG-DEF/OTHER MAINT		0	3.2	1.5 =	3.7	23.6 13.1 4.0		28.4 14.3 2.9	## #	1
OTHER COMPONENT TOTAL			4.2 3.2	1.4 1.5	5.9 28.3	31.4 100.0	17.4 91.0			

REASON/FAILLRE MODE ACTION REASON/FAILLRE MODE 14118 COLLECTIVE PITCH AS REPAIR 020 MORN, CHAFED, FRAYED 127 ADJST/ALIGN IMPROVER 503 SUDDEN STOP 660 STRIPPED REPLACE 020 MORN, CHAFED, FRAYED 464 OVERSPEED 503 SUDDEN STOP 726 BRUSH FAILING/WORN OTHER COMPONENT TOTAL 14128 CYCLIC SWSH PLT/SUP REPAIR	F C SY	0	PM / PA AVI)	1.2	PS/ PH PAT: 0.5 0.4 0.6 2.5 0.4 0.4	31.8 9.1 9.1 4.5 9.1 27.3 9.1 4.6	4.2 0.8 1.9 0.4 1.0 0.8 0.8	53.2 10.6 24.0 5.3 13.3 51.2 10.2 10.2	£н 1	
REPAIR 020 WORN, CHAFED, FRAYED 127 ADJST/ALIGN IMPROPER 503 SUDDEN STOP 660 STRIPPED REPLACE 020 WORN, CHAFED, FRAYED 464 OVERSPEED 503 SUDDEN STOP 720 BRUSH FAILING/WORN OTHER COMPONENT TOTAL 1412B CYCLIC SWSH PLT/SUP REPAIR	:	0	1.4	1.0	2.5 0.6 0.4 0.5 2.5 0.4 0.4	31.8 9.1 9.1 4.5 9.1 27.3 9.4 4.6	4.2 0.8 1.9 0.4 1.0 4.0 0.8 0.8	53.2 10.5 24.0 5.3 13.3 51.2 10.2 10.2	1	1
REPLACE CYCLIC SHSH PLT/SUP		0	1.6 C. 0	1.0	0.4 0.5 2.5 0.3 0.4 0.4	7.5 9.1 27.3 9.4 4.6 9.1	1.9 0.4 1.0 4.0 0.8 0.8	51.2 10.2 10.2 10.2 10.2	2	
CY OZO WORN. CHAFED, FRAYED 464 OVERSPEED 503 SUDDEN STOP 720 BRUSH FAILING/WORN OTHER COMPONENT TOTAL 14128 CYCLIC SWSH PLT/SUP REPAIR			1.6 C. 0	1.0	2.5 0.8 0.4 0.4	27.3 9.1 4.6 4.6 9.1	4.0 0.8 0.8	51.2 10.2 10.2 10.2	2	2
COMPONENT TOTAL 14128 CYCLIC SWSM PLT/SUP REPAIR			Ç. Q		0.4 0.3 3.8	4.6 9.1	0.8 1.6	10.2 10.2 20.5		
1412B CYCLIC SWSH PLT/SUP			Ó. 9	1 1			7 7	A A		
REPAIR		SY		248	9.2	100.0	5.2	100.6		
730 FG02E				**************************************	~ ~ ~	0.47	# # . Se	25.4 9.9 12.3		A.
INSTALL ON	1	G	13.0	2.0	1.3	3.0	16.3	7.2	5	3
REPLACE ON OZO WORN, CHAFED, FRAYED 190 CRACKED 503 SUDDEN STOP 710 ERG FAILING/FALLTY 803 NO-DEF//IPE CHANGE 935 SCORED OR SCRAICHED				* *	1.2 2.5 1.2 1.1	3.0 5.9 3.0 3.0		1.5	1	
OTHER COMPONENT TOTAL				2.4	11.7 42.2	27.7 100.0	22.5	10.6 105.9		

TA	BLE :	XXX	VII ·	- Co	ntinu	ed				
ACTION REASON/FAILURE MODE	OFF A/C	E	PA Avg	ro Pen	FH Rate	FH PCNT	RATE	fh PCNY	HA/ FH	HH. FH
14141 FLT CHIRL CYL/C	אין זאנ.	LVÉ	»=- - -				~~~~			
CHECK 799 NO DEFECT	GR	0	2.0	2.0	20.9 23.9	16.0 16.0	41.6	7.2 7.2	3	3
REPAIR 127 ADJST/ALIGN IMPROP 381 LEAKING-INTERM/EXT	CN ER ER	0	3.5	2.0 *	33.0 14.6 4.2	25.3 11.2 3.3	114.4 57.3 20.0	19.9 10.0 3.5	2	2
REPLACE 135 BINDING/STUCK/JAKK 381 LEAKING-INTERN/EXT 602 FAIL CUE ASSOC EQU	CAN EO ER EP		3.2	2.1 *	40.9 3.4 27.1 3.8	31.4 2.5 20.5 2.9	130.9 17.4 72.7 5.4	22.8 3.0 12.6 0.9	I	1
OTHER COMPONENT TOTAL			2.1 4.4	1.9	35.5 130.3	27.2 160.0	268.5 575.4	50.1 100.0		
IS115 WAIN ROTOR HUB							_~====			
REPAIR 127 ACJST/ALIGN IMPROPE 190 CRACKED	L <i>n</i> Er	0	1,5	1-6 + +	25.0 5.8 3.3	25.3 5.9 3.4	36.6 9.2 2.0	7.8 1.9 0.4	2	3
REPAIR 710 BAG FAILING/FAULTY	Ω₹F	Đ	11.7	1.4	14.6 11.7	14.8	171.5 152.3	36.5 32.4	3	2
REPLACE 503 SUDDEN STOP 561 UNABLE ADJ TO LIMI 710 BRG FAILING/FALLTY 804 MO-DEF/SCHED RAINT	C¥ TS	5	6.9	2.2 * *	28.6 2.3 2.5 2.9 4.6	29.1 2.5 2.5 2.9	198.5 19.1 10.3 20.1 42.9	42.3 2.5 2.2 4.3 9.1	group.	Amag
OTHER COMPONENT TOTAL										
15211 TAIL ROTOR MB										
CHECK 799 ND DEFECT 804 NO-DEF/SCHED MAINT				*	0.5	0.9	Z=1	1.0		_
REPAIR 710 BRG FAILING/FAULTY	CFF	Đ	2 ∈	1.0	14.2 10.9	15.8	39.5	18.6	2	Ž

Tabi	CE X	X	II -	Con	tinue	ed				
4C / YON	OFF	Ē	FA	NC:	FH	FH	MY/ FH	FH	74/	##/
REASON/FAILURE MODE	A/C	1	AVG ·	FEN	PATE	PÇNT	RATE	PCNT	FH.	FH
INSTALL 799 MD DEFECT	CN	Ō	7.9	1.7	2.5 2.5	2.£ 2.6	19.9 19.9	9.4 9.4	4	4
REPLACE 135 BINDING/STUCK/JAMMES 190 GRACKED 710 BRG FAILING/FAULTY 864 NO-CEF/SCHED MAINT)			* *	2.9 3.6 3.8	3.2 4.2	145.8 7.0 9.8 12.8 71.7	3.3 4.6 6.0	1	eting.
OTHER COMPONENT TOTAL			C.0 2.5	1.2	18.8	20.9 198.0	0.0 E.655	10010 0.0		
15212 TAIL ROTOR BLADE	ASSY	7								
REPAIR 127 ADJST/ALIGN IMPROPER	CH l	Ď	0.9	1.2	4.6 Q.8	15.5 2.6	4.2 0.4	7.2 0.7	Ż	3
INSTALL 093 HISSING PART 799 NO DEFECT	Ch	Ō	4.7	1.0 *	2.1 0.8 1.3	7.0 2.8 4.2	9.8 4.2 5.6	16.7 7.1 9.6	Ţ	ż
REPLACE 117 DETERIORATED 127 ADJST/ALIGN IMPROPER 503 SUDDEN STOP 602 FAIL DUE ASSOC EQUIF 731 BATTLE DAMAGE 780 BENT, SUCKLED, LTC 803 MO-DEF/TIME CHAMGE	t 3		-	* * * * * * *			3.7 4.4 8.7 3.3 19.7 15.5	6.3 7.5 14.9 5.7 18.3 26.4		New Property Control of the Control
ÖTHER CGRPONENT TOTAL			C. 0 3.1	igeneral An Orași	2-1 29-5	7-0 100-0	Q.0 91.3	0.0 100.0		

		-			ntinu ——					
ACTION REASON/FAILURE HOC?		9-	##	2.5	⊊W.	Eu	84/ Fe	- a	49 4 4	====
ACASUMITATILUME MIA I	<i>A/</i> C	¥ 	AVG	FER	3TAS 	PCRT	rn RATE	PCNT	f#	FH
ZZZOO T53 ENGINE		+4-								
REPAIR 230 DIRTY	OH	Đ	3.0	1.3	13.8	15.8	40_R	€.#	2	3
230 DIRTY				•	2.5	₹.9	3.1	Q.5	*	3
REPAIR	OF#	D	15.3	2.1	4.2	4.0	64.1	9.2	3	2
REPLACE	(H	D	43.0	3.0	34.2	39.2	1472.3	211.1	4	1
381 LEAKING-INTERN/EXT	ER			毒	3.4	3.8	197.3	2E.3	_	_
EDA NO-DEF/SCHED MAINT				*	7.5	\$.6	325.4	46.6		
ÔTHER			0.0		35.1	40.2	0.0	0.0		
COMPONENT TOTAL			16.1	2.9	87.3	109.0	1577.2	100.0		
22261 FUEL REGULATOR		73 10 100				*****		· · · · · · · · · · · ·		-
LEPAIR	ON	.1	0.9	1.2	12.5	71.9	11.4	40 3	Î	-
LET AUGULTALIGN INPROPE	2		:	8	11.3	65.9	9.9	70.5	Į.	4
381 LEAKING-INTERM/EXTE				_	***	79.5	2.8.2	20 4 2		
EFLACE	ne.	Ω	A. 0	1.7	2.3	10 €	30.0	74.	ž	
REPLACE 127 ADJST/ALIGN IMPROPE	R	•	~*~	& * * *	1.7	9.8	10.9	33.5	Ē	-
GTHER COMPONENT TOTAL			1.6	1.5	17.1	7.3 160.6	0_0 2_15	0.0 200.0		
22277 OIL HOSE			*****					****		-<-
REPAIR	ON	0	€. 4	1.0	5.0	54.5		45.2	1	2
020 WORN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTE 437 IMPROP POSTNO/SLCTD 730 LOOSE					1.7	18.2	0.7	14.5	~	_
AND THE PORT OF THE PROPERTY AND A PARTY OF THE PARTY OF	3			*	2.5	27.3	1.0	23.9		
TAN INCHE FUSING/SELIU	•			#	0.+	4.5	0-1	2,€		
	ON	0	1.3	1.2	4.2	45.5	3,4 4.8	111-0	2	1
^20 WGRN, CHAFED, FRAYED	_			*	3.3	36.4	4.6			
381 LEARING-INTERMIENTE 780 BENT. BLCKLED, ETC	<u> </u>			\$	0.4	4.5	Q.2	3.4		
	*		\$ # Z	*	0.4	4.5	0.4	8.7		
COMPONENT TOTAL						100.0	7.6	190.C		

TABLE XXXVII - Continued										
	OK /						** /			
action	CFE	Ē	74	AS.	FH	Fái	7	F -	P1/	
REASON/FAILURE FODE	<i>≛/€</i> 	¥ 	TAE	₽£5 	231E 	?€₹ ₹	RATE	PCST	₹ #	F#
ZáZic Hast Asst								*****		,
				_			15.7		2	₹
OZO WORN, CHAFED, FRANED				*	2.5			5.4		
100 DAUNCH OFFT AIRS/ACT				*		<€ 5.4	5. €	0.4 3.7		
730 1035E				4	*==	2.7				
OZO WORN, CHAFED, FRAYED 108 BZOKEN SPTY BIRE/KEY 167 TORQUE INCORRECT 730 LOJSE 935 SCORED OK SCRAICHED				*		5.4	1.7			
REPLACE		ē	8. 3	2-2	12.9	41.9	107.4	92.2	1	1
CZO WORN, CHAFED, FRAYED				š			4.7			_
16) TORQUE INCORRECT				*	Q.8	2.7	5.€	5.0		
503 SUDDEN STOP				\$			21.2			
803 MO-DEF/TIPE CHANGE 935 SEGRED OR SCRAYCHED				*	2.5 2.5		29.5	1/.0 27.0		
733 SCORES OR SCHRICTES				•	2.3	2**	2442	€ 5 ±₩		
OTHER			G. 0		9.2	25.7	0. 0	9. \$		
CO-PONENT TOTAL			4.Q 	2.1 	30.9	100.0	123-1	160.0		-
2621E MAIN INPUT COILL	≜5S¥	P								
repair		ð	3.#	2.0	4.2	15.4	15.7	15.5	Ž	毫
35) LEAK (NO-SAIFRN/EXIER				*	4,2	15.4	15.7	15.4		
REPLACE	(Mg	Ō	ð.4	¥.7	13.4	49.2	\$\$. \$	86.1	ž.	
301 Learths-Intern. Exter				\$		43.1	77.3	77.5		
OTHER			C. ė	Ç.Õ	9.6	35.4	0.0	9.6		
OTHER COMPONENT TOTAL			3.7	1.7	27.1	104.9	101.2	100.0		
262)J 1081MG									, <u></u>	
CHECK		0	1.0						7	ቘ
799 NO DEFECT				÷	0.4	14.4	0.4	12.4		
		Ē	1.9		1-3			50.0	•	I
381 LE4X ING- (NTERS/EXTER				춒	1-1	42.0	1,7	5¢.0		
REMOVE TO AN ACCOUNT	ġţ.	Ū	€.4	1.0			9.2		3	3
799 NO DEFECT				*	9.4	i4.A	0+2	5.1		
Install		O	2.4	1.0	3. 4	14.4	0. 5	25.l	*	7
799 NO SEFECT				•		£4.4	3. €	25.1		_

	ON/	L	VH /	AVG	V & /	YA/	2H/	HH/	R-A	-N-K
ACTION	OFF	E	ÚΔ	NO.	54	5 54	EH	su.	44/	iii /
REASON/FAILURE HODE	A/C	٧	AVG	FEN	3748	PCNT	RATE	PCNT	FH	FH
REPLACE	ON	n	1.1	1.0	G.4	1é-4	0.5	13.8	5	3
020 WGRN, CHAFED, FRAYED	•	Ū		*	0.4	14.4	0.5	13.8		
COMPONENT TOTAL			1.2	1.3	2.9		3.6			
2621K .HOSE					*					
REPAIR	CN	C	0.6	1.0	1.7	50.0	1.0	45.2	1	2
020 WORN, CHAFED, FRAYED	_			*	0.4	12.5	0.4	18-1		
381 LEAKING-INTERNIEXTE 719 BROKEN GROUND WIRE	K			*	0.8	1.2.5	0.3 0.3	12.7		
REPLACE	ON	0	1.4	1.1	1.7		2.3		2	1
OZO WORN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTE			•	*	1.3	37.5	1.9	84.7	_	-
COMPONENT TOTAL			1.0	1.1	3,3	100.0	3.4	100.0		
26111 MAIN DRIVE SHAFT	ASSY	?								
REPAIR		O	3.3				48.9		2	2
381 LE4KING-INTERN/EXTE				*		25.0		44.0		
REPLACE				1.2	24.2	45.3	82.3	78.2	1	1
OZG WORN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTE	٥		•	*	3.8	7.0	14.5	13.8		
503 SUDDEN STOP					2.5	4.7	35.1 6.5	6.2		
804 NO-DEF/SCHED MAINT				*	2,1	3,9	6.5 9.3	8.8		
OTHER			0.0		14.6	27.4	0.0	0.0		
COMPONENT TOTAL			2.5	1.1 	53.4 	100.0	131.2	100.0	_===	
YEEA 20ART NIAM 11535										
INSTALL	ON	D	79.5	2.0	0.4	1.9	33-4	13.3	2	2
REPLACE	ON	O	27.2	2.9	9.2	40.8	250.0 43.2	99.9	1	1
167 TORQUE INCORRECT					1.2	5.5	43.2			
190 CRACKED 503 SUDDEN STOP				*	0.8	3.7	18.5 50.7	7.4		
803 NO-DEF/TIME CHANGE				\$			63.0			
OTHER			C- 0		12.9	57.4	0.0	0.0		
COMPONENT TOTAL			12.6	2.8			283.4			

TA	BLE	XXX	WII	- Cc	ntin	neg				
ACTION REASON/FAILURE MODE	CN/ GFF A/C	L E Y	FH/ FA AVG	AVG NG PEN	PA/ FH RATE	FA/ FH PCNT	HH/ FH RATE	HH/ FH PCNT	R-A- MA/ FH	-N-K #H/ FH
26411 TAIL DRIVE SHAFT	ASST				~~~					
REPAIR 780 BENT-BUCKLED.ETC 935 SCORED OR SCRATCHED	ON	0	1.0	1.1 \$	11.3 2.1 4.6	30.0 5.5 12.2	11.4 3.2 4.0	31.3 5.9 10.9	5	2
REPLACE OZO WORN, CHAFED, FRAYED 503 SUDDEN STOP 780 BENT, BUCKLED, ETC 935 SCORED OR SCRATCHED	ON	G	1.6	1.2 \$ \$ \$	23.4 1.3 6.3 2.9 10.4	62.2 3.4 16.7 7.8 27.7	37.4 3.8 5.3 4.9 16.4	103.2 10.5 14.8 13.6 45.2	1	Toward .
OTHER COMPONENT TOTAL			0.0	1.2	2.9 37.4	7.8	0.0	0-0		
26413 HANGER ASSY										****
REPAIR 710 BRG FAILING/FALLTY				*	30+1	17.6	57.6	34.8		
REPLACE 020 HORN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTER 503 SUDDEN STOP 710 BRG FAILING/FALLTY	ł	0	1.9	1.1 *	113.2 59.7 13.6 7.1 18.3	66.3 35.0 8.1 4.2 10.7	215.0 98.9 53.1 7.3 29.9	129.8 59.7 32.1 4.4 18.0	1	
OTHER COMPONENT TOTAL										
26414 INT GEARSOX				~ ~ 44		~ * * * * * * * *			n — # = #	
REPAIR 070 BRCKEN 306 CONTAMINATION 381 LEAKING-INTERN/EXTER 916 IMPEND FAIL/OIL ANYL				\$ \$ \$	2.1 1.7 1.7	3.4 2.3 2.8	2.3 7.6 1.5.	3.3 0.9 2.2		
INSTALL 799 NO CEFECT	QN	O	1.5	1.0	3.3 2.5	5.5 4.1	5.0 2.7	7.1 3.8	3	3
REPLACE 020 WORN, CHAFED, FRAYED 167 TORQUE INCORRECT 381 LEAKING-INTERN/EXTER 503 SUDDEN STOP	ON	C	2.6			38.6 12.4	60.8 16.8 5.5	87.2 24.1 7.8 35.6	gen g	*
OTHER COMPONENT TOTAL			0.0 1.2	1.2	22.6 60.5	37.3 100.0	0-0 74-4			

	ON/	Ĺ	/ H/	AVG	¥4/	¥4/	PH/	MH/	O 4	
ACTION	CEF	F	¥A	1.7	Eu	Eu	Eu	e		:
HEASON/FAILURE MODE	A/ €	¥ 	AVG.	≯EN	PATE	PCNT	RATE	PCKT	FH	FH
20415 TAIL GEARBOX			جي جن ن	*****	*****		.=	*****		
REPAÍR 230 DÍRTY	CN	0	0.8	1.1	15.9	25.2	12.9	8.9	2	Ż
										~
372 KETAL ON MAGNET PLU	G			*	1.7	2.6	1.7 1.1	1.2		
381 LEAKING-INTERN/EXTE 916 IMPEND FAIL/OIL ANY	R			#	1.7	2.6	1.1	0.8		
710 INPEND PAIL/UIL ENY	L			*	4.Z	6.6	4.3	3.0		
INSTALL	CN	n	4.3	1.7	1.7	2.4	10.5	7 2	3	
799 NO DEFECT		•	043	*	1.3	2.0	2.1	1.5	3	3
REPLACE	ÖN	Ç	4.8	1.6	27.1	43.0	130.3	90.0	1	3
VZV WUKN+CHAFED.FRAYED				*	5.0	0.5	24.4	16.8	-	_
381 LEAKING-INTERN/EXTE 503 SUDDEN STOP	R			*	5.4	8.6	20.6 6.0	14.2		
800 NO-DEF/OTHER MAINT					2.5	4-0	6.0	4.1		
916 IMPEND FAIL/OIL ANY				*	2.5 3.3	4.0 5.3	5.5 25.0	3.8 17.3		
OTHER							0.0			
COMPONENT TOTAL			2.4	1.5	63.0	100.0	153.6	100.0		
29132 PILLOW BLK ASSY										
REPAIR	CN	D	U. 9	1.0	1.3	33.2	1.1	32.2	2	2
020 WORN, CHAFED, FRAYED 710 BRG FAILING/FALLTY				*	0.4	11.1	0.1 0.1 0.6	3.7		
900 BURNED OR OVERHEATE	_			*	0.4	11-1	0.1	3.7		
AND SORWED OF DACKHETTE	U			*	0.4	11.1	0.8	24.8		
REPLACE	CN	D	1.3	1.0	2.5	56-8	3.3	36.4	1	1
OZU WGRN, CHAFED, FRAYED				_	~ *					
710 BRG FAILING/FALLTY				*	0.4	11.1	2. (0.6	17.6		
COMPONENT TOTAL			1 *	1 0		100 0		100.0		

ACTION REASON/FAILURE NODE	ON/	Ĺ	FH/	AVG	74/	FA/	FH/	NH/	Q-4-	-14-1
AGTION	CFF	Ε	F.L.	AC.	FH.	ĖН	FH	FH	HA/	MH/
						PCNT	37E 	PCKT	FH 	FH
29133 TRIPOD ASSY			, , , , , , , , ,						F447	
REPAIR 020 WORN+CHAFED+FRAYED 070 BROKEN 710 BRG FAILING/FALLTY 730 LOOSE	ON	D	1.5	1.2	5.7	37.2	10.3	48.5	Z	2
O20 WORN+CHAFED+FRAYED				*	1.3	7.0	3.5	16.7		
710 ARG FAILING/FALLTY				¥.	0.0 n.a	4.5 4.5	0+Z	12.8		
730 LGOSE				*	1.7	.9.3	2.4	11.2		
REPLACE 020 WDRN,CHAFED,FRAYED 710 BRG FAILING/FALLTY 730 LODSE										1
020 WDRN, CHAFED, FRAYED				#	4.2	23-2	9.2	43.1		
110 PKP LATEINP/LATEIA				*	0+8 7 7	4.7 0.3	Sel c t	5.6 16.4		
OTHER COMPONENT TOTAL			0.0 1.4	1.1	4.2 18.0	23.3 100.0	0.9 24.5	0.0 10ō.0		
2931J DROOP COMP CAMED				7 - 2			********		ه بند عد بن جد	
REPAIR 12: ACJST/ALIGN IMPROPE 315 RPM FLUCTUATION 537 LOW POWER OR THRUST	ON	0	0.7	1.2	2Ž.,1	-80.3	15.5	62.6	1	1
12: ACJST/ALIGN IMPROPE	i.			\$	15.0	54.5	5.9	35.9		
515 KPM PLULIUATIUN 517 INU DAUFO NO TLINET				*	Z.1	7.5 3.4	8.0	3.2		
REPLACE 127 ACJST/ALIGN IMPROPE	OM -	O	2.3	1.5	3.3	12-1	7-7	31.0	2	\$
OTHEX COMPONENT TOTAL			0.8	1.1	2.1	7.6	1.6	6.4		
COMPONENT TOTAL			0. 9 	1.3	27.6 	100.0	24.8	100.0 		نبوذ
2931J10 LINEAR ACTUATOR										
REPAIR 177 ADISTIALICH IMEDOÖS	ON	C	1.0	1.3	33.0	41.6	34.6	32.0	1	2
EE! MUSET/MEIUN INFAUFC	ns.			7	£441	27.2	£V*0	47*6		
REPAIR 170 CORROCED	CFF	D	1.2	1.3	8.3	10.5	10-1	9.4	3	3
REPLACE	CN	Û	2.3	1.3	22.1	27.9	<u> 5</u> 0.9	47.0	2	1
121 ACUST/ALIGN IMPROPER	R R			\$	6.3	7.9	14.4	13.3		
127 ACJST/ALIGN IMPROPE 135 BINDING/STUCK/JAPHE 242 NC OPER.REAS UAKNOW	¥			*	6.3	7.9	1U-/ 9.5	8+8		
OTHER COMPONENT TOTAL			25 CE	# =						

				·						
CT10H REASON/FAILURE MODE	A/C	V	AVG-	PEN	FA/ FH Rate	PCNT	RATE	PCNT	FH	FH
9321 RPH HARN LMT DET/	~-#=	ه چه د				·	*****	, , , , , , , , , , , , , , , , , , ,		B
HECK 799 NO DEFECT	ON	0	1.3	1.5	8.3	5.5 5.2	11.6 7.4	5.4 3.4	4	4
EPAIR 127 ADJST/ÄLIGN IMPROPER	GN	0	1.2	1.4	53.0 45.5	33.2 28.4	63.5 53.0	29.4 24.5	1	2
EPAIR 127 ACJST/ALIGN IMPROPER 615 SHORTED	OFF	0	1.1	1.2	44.7 28.0 12.5	27.9 17.5 7.8	49.3 22.5 19.3	22.8 10.4 8.9	3	3
EPLACE 242 NO OPER,REAS UKKNOWN 374 INTERNAL FAILURE 901 INTERMITTENT 958 INCORRECT DISPLAY	ON	C	2-4	1.4	49.7 9.2 12.5 5.9 7.1	31.1 5.7 7.8 3.7 4.4	119.3 20.2 25.4 13.8 14.3	55.3 9.3 11.8 6.4 6.6	2	1
OTHER COMPONENT TOTAL			0.G 1.5	1,4	3.8 159.9	2.4 100.0	0.0 243.7	0.0 100.0		
9422 OIL COÖLER					<u>.</u>					
EPAIR OTO BROKEN 127 AGUST/ALIGN IMPROPER 190 CRACKED 230 DIRTY 381 LEAKING-INTERN/EXTER 780 BENT, BUCKLED, ETC	ON	Q	2.6	1.5	3.3 0.4 0.4 0.4 0.4 1.3	33.3 4.2 4.2 4.2 4.2 12.5 4.2	8.7 0.4 0.4 0.4 5.8 1.3	24.5	1	Z
EPLACE 190 CRACKEO 305 CONTAMINATION 381 LEAKING-INTERN/EXTER 900 BURNED OR OVERHEATED		C	4.2	1.7	2.9 0.4 0.4 1.7 0.4	29.1 4.2 4.2 16.6 4.2	12.3 1.6 0.6 7.2 2.8	34.3 4.5 1.7 20.3 7.9	2	1
OTHER COMPONENT TOTAL										

TAÈ	LE :	XXX	VII -	- Coi	otinu	eđ		***************************************		22.74201
ACTION REASON/FAILURE MODE		£	PA Pa	ren Vo	FH	PA/ FH \$CNT	FH	F#	KA/	KH,
42211 STARTER GENERATO	 R						==			
CHECK JS NO DEFECT	GN	0	1.0	1.4		21.3		_	Ž	4
REP.IR 020 WORN, CHAFED, FRAYED 127 ACUST/ALIGN IMPROPEI 374 INTERNAL FAILLRE 381 LEAKING-INTERN/EXTER 437 IMPROP POSTND/SLCTO 719 BROKEN GROUND FIRE	2	D		8. * *	1.2 2.1 0.6 1.2	36.2 3.7 6.2 2.5 3.7 2.5	0.7 2.1 3.1 3.9	9.7 2.3 3.5 4.3	1	1
INSTALL 799 NO DEFECT	OH.	Đ	4.5	1.8		8.7 6.2		14.6 13.9	4	3
REPLACE 374 INTERNAL FAILURE 800 NO-DEF/OTHER HAINT 900 BURNEC OR OVERHEATE	CN	D	3.3	1.8	1.7	18.7 5.0 2.5 2.5	3.1	3.4	3	Ź
OTHER COMPONENT TOTAL				1.6		15.0 100.0		24.6 100.0		
STEEL STAB CHTRL ANT S	7 S	**************************************	* ****					* *** *** ***		
CHECK 799 NO DEFECT 958 INCORRECT DISPLAY	ON	0	1.0	1.0 *	0.4	13.4 6.7 6.7	0.2	1.3	3	4
REPAIR 127 ADJST/ALIGN IMPROPE 169 INCORRECT VOLTAGE	GN R	D	1.1	1.2	1.7	33.4 26.7 6.7	2.0	11.8	2	Ż
INSTALL 799 HD DEFECT	CH	D	3.0	3.0 *		5.7 6.7			4	3
REPLACE 242 NO OPER,REAS UNKNOW 561 UNABLE ADA TO LIMIT 901 INTERMITTENT 958 INCORRECT DISPLAY	•	Đ			1.3	40.1 20.0 6.7 6.7	1.5	9.0 18.9 1.6	1	1
OTHER COMPONENT TOTAL			18.0 2.7	1.4 1.4	0.4 5.3	6.4 109.0	5.7 7.61	43.Z 100.0		

<u>.</u>..

TABLE XXXVIII.	CH-	-47	HEL:	ICOP:	PÉŘ	·	EQUIR	EMENT	s, 	
ACTION REASON/FAILURE HODE	CN/ OFF	L E	PH/ PA	AVG		MA/ FH	PH/ FH RATE	**	PA/	
14021 SHASH PLATE CONT	ZZZZZZ ROL		f ##&	****	4 d 4 a 4 a 4	(** = + + + + + + + + + + + + + + + + +		*****		
REPLACE D20 WORN, CHAPED, FRAYED 199 ND DEFECT 803 NO-DEF/TIME CHANGE		D	14,1	*	4.4 11.2	8.3	395.2	44.5	1	1
CHECK 799 NO DEFECT	OFF	Ď	4.0		4.5 3.4		17.9	2.0	3	3
REPAIR	OFF	Ō	12.0		5.1	9.1	60.8	6:9	5	Ż
OTHER COMPONENT TOTAL			23.1 16.0				414.0 887.9			
14060 DRIVE ARM ASSY-T	RANS	-				,-,		,-,,		
REPLACE 020 MORN, CHAFED, FRAYED 730 LCOSE 799 NO DEFECT 803 NO-DEF/TIME CHANGE		D	1.5	* * *	12.2 1.8 4.9	53.9 21.2 3.1 8.5	55.5	25.5	1	1
CHECK	CFF	Đ	3.0		10.3	18.0	31.3	14.4	2	3
REPAIR 730 LOGSE	OFF	C	6.0		6.7 1.9		40.3	18.5	3	Z
OTHER COMPONENT TOTAL			9.6 3.8				90.8 217.9			
15008 HEAD-ROTARY WING	Å551	f								
REPLACE OZO WORN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTE 799 NO DEFECT 803 NO-DEF/TIME CHANGE			10. S		11.0 5.5 28.8		983.9	17.5	1	3
CHECK 799 NO DEFECT	OFF	D	60.0	\$		11.0 4.4	1413.5	25.2	3	Ž
REPAIR	CFF	D	80.0		25.0	11.7	2003.9	35.7	â	1
OTHER COMPONENT TOTAL			16.5 26.3				1216.6 5517.9			

TABI	E X	XXV	III -	- (0	it Luy					
ACTION REASON/FAILLAE NGCE	CE E	€.	#	4 F	7 A.	PA/ FH PCNT	. ∓ ≡	#	5-2	
15102 DAPPEMER, FALTTER					. 		-unin j.			
REPLACE 020 WORM, CHAFED, FR±YED 127 ADJS1/ALIGH IMPROPE 374 IMTERNAL FAILLRE 381 LEAKING-IMTERN/EXTE	CN e R	A Comp	2.3	\$ * &		90.2 21.7 4.5 5.7 21.4	57. 3	91.7	**************************************	-
OTHER COMPONENT TOTAL			1,5		3.3 13.4	9.\$ 100.0	5.3 75.5	1.1 4.001		
15133 2001 ASSY-RCIGA	READ							-		· · · · · · · · · · · · · · · · · · ·
REPLACE 020 YORN, CHAFED, FRAYED 070 BROKES 799 NO SEFECT 9. IGRN	Č*	5	1.9	* *	9=1 =1.9	03.3 15.5 15.5 15.5 23.0		151.5	S	*13
REFAIR		Ō	1.5		3.4	7.5	ė.ģ	13.0	Į	Ž
OTHER COMPONENT TOTAL			0.4 1.8		1.9 49.6	4.E 6.091	0.0 45.2	o.o e.ooi		-
15170 STORT CUP-DIL TA	IK	· · · · · ·	-	• • • • •		**********			* • • • •	
REPLACE OTO BROKEN 190 CRACKED 381 LEAKING-INTERN/EXTE			1.2	*	20. <i>0</i> 19.9	99.2 50.8 27.7 5.0	43,4	144-3	基	
OTHER COMPOSENT TOTAL			\$.0 1.2		4.3 39.4	8.6 0. 69 1	0 <u>.0</u> 46.9	0.0 0.402		
15234 SPRING DROOP STO	P.AF 1									
070 BROKEN 664 TENSION INCORRECT				- - - 						N. A.
SENTO TESPOSMOS						4.7 6.6		0.0 2.00 <u>1</u>		

745	LE X	XXI		- Co	ntinu	eđ				
ACTION REASON/FAILURE MODE	课/ GF Aだ	É	71	ΑŪ		FN	FH	FH	F±/	-
15271 PADDP STOP							*************************************			
REPLACE 1020 XCFN, CBAFED, FRAYED 1093 X1551NG PGAT 127 ADJST/ALIGH INFROPE 1500 NO-DEF/OTHER PAINT 104 NO-SEF/SCHED PAINT		Ô	1.6	*	0.1 0.1 0.2	2.6 2.6 3.7		22.0	3	3
CHECK 799 NO BEFECT		Ō	1.5	•		53.4 33.4	3.4	39.4	4	1
TST ADJST/ALTGX TXPROPE	CN A	Ō	1.3	ŧ		10.¢ 20.\$	2.4	27.5	2	2
REPAIR 127 ADJST/ALICH IMPROPE 567 RESISTANCE INCOMEC 709 NO DEPECT 400 NO-CEP/OTHER HAINT	2	_	1.5	***	0.2 0.3 0.3	12.9 3.2 3.2 3.2		2.7	1	4
OTHER COMPONENT TOTAL	- • ÷		1.5	-	G.1 5.8	2.4 190.0	0.2 8.5	2.4 100.5	_	
2004 Shime, alreadft,										
REPLACE 030 WORN, CHAFED, FRATED 070 SKOKEN 156 MISSING HARDVARE 799 NO DEFECT	Œ	3	77.5	橐	25.8 18.3 9.1	3.7 2.6 1.3	ē,0000j	76.3	No.	
CHECK 799 40 DEFECT	of F	Đ	35.9	ē		10.4 2.5	2779.3	21.2	47	3
repair	ŒF	Đ	79.9		49.9	7.1	3995.0	M.5	3	2
COPPORTE TOTAL			C.Ø 23.¢				0.0 \$.57781			HER DADAHE HER BEITT PROSEEN HEROEGE HE

	ue v	212E 1		- (0	ntinu					
	CH/	Ĺ	护4/	AVG	FA/	#k/	PH/	Kh/	Ř-A-	-24-1
ACTION REASOM/FAILURE MODE	OFF	£	₽Ă	VQ	FH	FH	FH	fH	MAZ	MH/
REASON/F21LURE MODE	A/C 	¥	AVG	≯EN 	######################################	PCHI	RAIE	PCRI	+#	fh
22074 SERSING ELEVENT.	FIRE	CET					 ,			
REPLACE	ON	Ò	1.7		82-8	87.5	140.7	107.3	1	1
020 WORN, CHAFED, FRAYED				*	25.4	26.9				
070 BROKEN 789 BENT.BUCKLED.E1C				*	26.9 5.0	28.4 5.3				
		Ġ	Ž+3		5.0	6.3	13.7	10.5	2	2
OTHËR			0.0		E 0	£ 9	0.0	0.0		
COMPONENT TOTAL							154.4			
22101 PUMP.OIL.ENGIME							*****		~~~	
XEPLACE	ON	ō	5.4		6.1	63.1	33.0	41.6	1	1
hon Undu-fülten.colven				•		5.9				
374 INTERNAL FAILURE 381 LEAKING-INTERN/EXTE	_			*		7.9				
410 LACK OF/IMPROP LUBE				*		27.0 3.9				
800 NO-DEF/OTHER MAINY				*	9.3					
ĀĐJUST	ON	Ö	3.0		0.5	5.2	1.8	2.3	3	. 3
127 ADJST/ALIGN IMPROFE	Ř			\$	0.4	4.1				
ŘEPÁIR	ON	Ò	2.0		1.3	13.6	2.7	3.4	2	2
OZO WORN, CHAFED, FRAYED	-	_				5.2			_	_
OTHER			25.5		1.6	16.9	41:5	52.7		
COMPONENT TOTAL			0.Z		9.7	100-0	79.4	105.0		:
22128 ACTUATOR ELEC/HE	CH+N2									
REPLACE	QN	0	2.3				40.0	69.49	1	Ī
020 WCRM.CHAFED.FRAYED				\$		S-4				
127 ADJST/ALIGN IMPROPE	Q			*	***	9.6 8.4				
374 INTERNAL FAILURE	E %		•	*		24.		•		
900 BURNED OR OVERHEATE				*		5.1				
CHECK	OH	C	1.7		1.3	5.7	2.3	4.6	Z	2
ŌTRER			6. l		1.3	6.3	7.7	15.4		
COMPONENT TOTAL			2.5		20.0	100.0	50.0	100.0		

										
TAB	LB X	XX	VIII	- Ce	ntinu	ıe₫ 	·	_		
ACTION REASON/FAILURE RODE	CFF A/C	E	PH/ PA AVG	AVO NO PEN	FA/ FH RATE	PA/ FH PCNT	Eh/ FH 3416	KI-/ FH PCKT	我一点 就走/ 手材	-4-4 FH/ FH
ZZ157 STARTER, ENGINE,	 IYO	-				- 	******			
REPLACE 020 HORN.CHAFED.FRAYED 374 INTERNAL FAILURE 381 LEAXING-INTERN/EXTE 799 NO DEFECT				* •	21.5 2.4 4.2 10.4	0.2 10.4 45.9	55.8	150.2	*	1
OTHER COMPONENT TOTAL			0.0 2.5	_	1.Z 22.7	5.3 100.0	0.0 55.8	0.0 0.001	-	
22310 CONE.EXHAUST.ENG	INE				~~~~.	· · · · · · · · · · · · · · · · · · ·				
REPLACE O70 BROKEN 190 CRACKED	O4	O	1.7	*	5+2 2-4 3+2	44,2	8.9	150.4	1	1
OTHER COMPONENT TOTAL			C- 1		0.1 5.4	2.8 100.0	0. 0	0.0 0.001		
22357 FAILPIPE, ENGINE					 -			<u></u>	-	
REPLACE 093 MISSING PART 190 GRACKED	C#	C	1.5	\$	0-2		\$ * \$	55.6	1	1
REPA'R	Œ	Ò	3.0		0.1	12.6	ð.€	15.4	2	2
OTHER COMPONENT TOTAL			3.0 2.9		0.0 1.2	0+0 0-001	1.0 3.3	30.7 200.0		
24009 ENGINE, APU							•			
REPLACE 020 WORN, CHAFED, FRAYED 070 BROKEN 374 INTERNAL FAILURE 381 LEAKING-INTERN/EXTES 799 NO DEFECT			-	*			\$5.4 £	8. 7	1	2
CHECK 799 NO DEFECT 804 NO-DEF/SCHED MAINT	ŒF	Ū	16.0	÷	15.2 5.7 2.9	5.5	243.3	7.5	3	,
REPAIR 070 BROKEN	ø	0	2.0	*	7.4 2.7	7.Z 2.5	15.0	0.5	4	4
										,

TAR	LE ?	XX	VIII	- Co	ntina	Đổ				
ACTION REASON/FRILURE MODE	€ ≸=	#	多毛	盖包	(H	Fig	FR FR RATE	- F	要基#	
REPAIR 281 LE4KING-INTERY/EXTE	CFF R	0	1177	*	15.5 3.8	15.1 3.5	1825.Ó	3 8.2	***	**
OTHER COMPONENT TOTAL			7¢.5 31.6		12.5 102. 9	12.2 100.0	20).5 2:6)£	77.2 169.0		
24167 KOTCR PUMP. 610.A	7L									
093 MISSING PART 135 BINDING/STUCK/JAME 374 INTERNAL FAILLRE 381 LEAKING-INTERNAEXTE	2			* * * *	€.2 €.5	5.4 16.7	\$. \$	52 1 \$-0 * 0	Rinda.	**************************************
ALJUST 127 ADJST/ALIGN IMPROPE 135 BIRDING/STUCK/JAMME	C# E D	Ç	1,7	÷	0.3 0.1	5.9 3.5 3.5	¥.5	1.5	3	*
HEPAIR 070 EROKEN 190 ERAKKED 381 LEAKING-INTERN/EXTE	CFF	5	18.9	事事	ō,5	11.5 11.5	25.3	i i si	2	
COMPONENT TOTAL			7.9		4.4	107.0	34.4	100.0		
121 ADJST/ALIGN (FROPE) 374 INTERNAL FAILLNE 331 LEARING-INTERN/EXTER 900 NO-DEF/OTHER WAINT 910 CHIPPED	CX R		• -	* *	0.2 0.2 0.3 0.1 0.3 0.2	10.0 4.0 10.0 5.0 5.0			jud.	(B) (B)
CORPONENT TOTAL			7.0		3.1	6.9 1 00. 9	ī.0 5.3	31.0 109.3		

ר	ABL	ΕX	XXVI	II -	Cont	inued				
ACTION REASON/FAILURE MODE	CN/ OFF A/C	L E V	PH/ PA AVG	AVG NC PEN	FA/ FH RATE	PA/ FH PCNT	MH/ FH RATE	MH/ FH PCNT	R-A- MA/ FH	FH PP/ FH-K
24376 YUMP, FUEL, APU										
REPLACE 070 BROKEN . 093 MISSING PART 374 INTERNAL FAILURE 381 LEAKING-INTERN/EXTE 800 NO-DEF/OTHER HAINT 900 BURNED OR OVER-EATE	R	0	1.8	# # # #	2.4 0.3 0.5 0.6 0.2 0.2	13.3 20.0 26.7 5.7 6.7	4.3	152.5	1	1
COMPONENT TOTAL			1.8		2.4	100.0	4.3	100-9		
26010 TRANS ASSY, COMBI										
REFLACE 020 WORN.CHAFED.FRAYED 301 LEAKING-INTERN/EXTE 799 NO DEFECT - 803 NO-DEF/TIME CHANGE	R		7.6	专	11.G 10.4 6.4	8.9	416.0	16.3	1	3
CHECK	OFF	0	12-0		14.9	12.1	178.9	7.0	3	3
REPAIR 800 NO-DEF/OTHER MAINT		D	1.2	*	14.3 6.7	11.6	16.9	0.7	4	4
REPAIR 135 BINDING/STUCK/JAMME 381 LEAKING-INTERN/EXTE 710 BRG FAILING/FALLTY	R		23.9	\$ * *	15.7 1.2 2.4 1.2	12.7 0.9 1.9 0.9	375.7	14.7	2	2
OTHER COMPONENT TOTAL			65.2 20.6		23.9 123.6	19.4 109.0	1560.9 2548.5	61.2 100.0		
26012 SHAFT ASSY, SYNC										
REPLACE 020 WORN, CHAFED, FRAYED 780 BENT, BUCKLED, ETC 799 NO DEFECT 800 NO-DEF/OTHER MAINT 803 NO-GEF/TIME CHANGE		0	2.4	\$ \$ \$	6.0	2.7 2.9 7.0 2.0	183.7	9.1	Pools	1

ACTION REASON/FAILURE MODE	OM/ OFF A/C	L E V	#H/ #A AVG	AVG NO PEN	PA/ FH RATE	PA/ FH PCNT	PH/ FH RATE	#H/ FH PCNT	R-A- HA/ FH	-N-K HH/ FH
CHECK	OFF	O	4.0		31,2	14.1	124.7	6.2	2	2
OTHER COMPONENT TOTAL			15.0 9.1		114.2 221.9	51.4 100.0	1713.7 2022.1	84.7 100.0		
26013 TRAKS ASSY, AFT R	OTOR									
REPLACE 093 MISSING PART 381 LEAKING-INTERN/EXTE 799 NO DEFECT 800 NO-DEF/OTHER MAINT 8G3 NO-DEF/TIME CHANGE	R			* * * *	36.5 3.7 4.0 11.0 7.7 2.7	5.7 15.6	1556.2	92.5	2	1
CHECK 799 NO DEFECT	OFF	D	12.0	-	3.6 3.0	5.1 4.2	42,9	2.6	3	2
REPAIR 020 WORN, CHAFED, FRAYED 070 BROKEN 170 CORROCED 230 DIRTY 381 LEAKING-INTERN/EXTE 540 PUNCTURED 730 LODSE 800 NO-DEF/OTHER MAINT 804 NO-DEF/SCHED MAINT	R	D	G-2	* * * *	10.2 5.1 5.1 5.1 5.1 15.3	14.5 7.2 7.2 7.2 7.2 21.7 14.5	11.4	0.7	1	3
OTHER COMPONENT TOTAL			C.2 15.0		0.0 111-7	0.0	65.8 1676.3	3.9 100.0		
26016 TRANS ASSY, FWD R							******			.
REPLACE 020 NGRN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTE 799 NO DEFECT 803 NO-DEF/TIME CHANGE	R		39.0	*	3+5 5+4	6.7 10:3 7.3	959.4	71.4	1	genej
CHECK 799 NO DEFECT	OFF	D	12.0	8	3.4 2.3	6.5 4.3	41-1	3.1	4	3

ACTION							847			
REASON/FAILURE MODE							FK RATE			
REPAIR	CN	0	C. 6		7.0	19.3	3.9	0.3	3	4
REPAIR 372 HETAL ON MAGNET PLU	OFF		24.0		8,6	16.4	207.5	15.4	2	2
372 HETAL ON MAGNET PLU	IG			*	1.3	2-5				
OTHER					9.1	17.2	132.5	9.9		
COMPONENT TOTAL			ر ہے۔ مست		52.8	100.0	1344.4	100-0		
26017 TRANS ASSY, ENGIN	E		- 3							
EPLACE	GN	0	4.5		47-4	29.9	213.4	16.9	.2	
OZO WORN.CHAFED.FRAYEC				*	8.2 4.5	5.2				
381 LEAKING-INTERN/EXTE 799 NO DEFECT	:K				4.2 5.1	3.2				
803 NO-DEF/TIME CHANGE				*	5-1 4-1	2.6				
HECK	CFF	D	4.2		53.2	33.6	221.9	17.5	1	
Q92 HISMATCHFD				*	4.1	2.6				
799 NO DEFECT 800 NO-DEF/OTHER MAINT					24.6 8.2					
OUD NU-DEFYGINER MAJRI										
REPAIR 381 LEAKING-INTERN/EXTE	CFF	D	12.2		32.9 5.5	20+8	402.6	31.9	3	
201 FERKING-INIEKUVENIE	т.									
OTHER			17-2		24.8	15.6	426.6 1254.4	33.7		
COMPONENT TOTAL			0.8 		128+3	100.0	1<34.4	100.0		
20019 SHAFT ASSY, TRANS	5									
REPLACE	ON	D	2.1		24.6	27.1	51.7	5.5	1	
799 NO DEFECT				*	3.6 2.7	3.9				
020 WORN, CHAFED, FRAYED 803 NO-DEF/TIME CHANGE				*	2.5	2.7	•			
· in mark	C11	_			10 5	21 6	78.1	<i>a</i> 2	2	
CHECK 799 NO DEFECT	UN	Ų	4.0		6.5			0+3	~	
800 NO-DEF/OTHER MAINT				* *		3.6		•		
REPAIR	OFF	D	13.9		5.7	6.3	78.7	8.4	3	
OTHER			18.0				734.3			
COMPONENT TOTAL			10.4		90.6	100.0	942.8	100.0		

TABI			7111		ıtinu	ed				
ACTION REASON/FAILLRE MOCE	CN/ CFF A/C	L E V	MH / Ma avg	AN NC MEN	RATE	PONT	MH/ FH RATE	PCNT	FF	FH
26038 SHAFT ASSY, AFT D	 R I VE									* # # *
REPLACE 020 WGRN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTE 799 NO DEFECT 803 NO-DEF/TIME CHANGE	R	D	19.7	*	11.2 1.8 1.4 3.0	4.3	220.2	51.0	1	(Heeff)
CHECK 799 NO DEFECT 803 NO-DEF/TIME CHANGE 804 NO-DEF/SCHED MAINT	CFF	D	4.0	* *	3.1	19.2 9.6 3.2 3.2	24.4	5.7	2	3
REPAIR	QN	D	2.6		1.5	4.7	3.9	0.9	4	4
REPAIR	CFF	D	10.4		3.3	10.3	34.0	7.9	3	2
OTHER COMPONENT TOTAL			15.4 13.6		9.7 31.8	30.5 100.0	149.5 432-1	34.6 100.0		
26084 ADAPTER ASSY, ROT	UR DR	IVE								
REPLACE 020 WORN, CHAFED, FRAYED 799 NO CEFECT 760 BENT, BUCKLED, ETC 804 NO-DEF/SCHED MAINT		D	2.2	\$	6.1 1.6 1.5 0.8	5.3 7.9	13.4	12.6	2	*
CHECK 799 NO DEFECT	GFF	D	4.0	*	2.8 1.7	14.7 8.8	11.3	10.7	3	3
REPAIR 070 BROKEN 190 CRACKED 690 VIBRATION EXCESSIVE 803 NO-DEF/TIME CHANGE 910 CHIPPED				* *	0.7 0.7 1.3	3.4 3.4	78.7	74.0	- Bende	- Article
OTHER COMPONENT TOTAL			6.4 5.5		0.4 17.2	2.3 100.0	2.9 106.4	2.7 100.0		
								•		

		-			ontin					
ACTION REASON/FAILURE MODE	CN/ OFF A/C	L E V	PH. PA AVG	AVQ NC MEM	FH FH RAT	PS/ FH E PCN	PH/ FH T RAT	NH/ PH E PCNT	R- Ma FH	**-N-1 / XH; FH
26086 SEAL, TRANS			^~= ~ ~.						-~ <i>-</i>	
REPLACE 020 WORN, CHAFED, FRAYED 381 LEAKING-INTERN/EXTER	ON L	0	15.0	*	21.: 3.: 12.1	5 92.3 3 14.0 7 54.6	322.0	308.0	1	1
COMPONENT TOTAL			0.0 13.8		1.5	7.7	0.0	6.9		
26173 CHIP DETECTOR MAG	TRA	, <u></u>		. يو. ومصد حد			746+6			·
REPLACÉ 070 BRÖKEN 381 LEAKING-INTERN/EXTER	CN	0	1.1	*	7.2 2.0 0.5	16.0 4.4 1.1	7.9	26.7	1	1
070 BROKEN	CN	0	1.1	*	3.1 2.0	7.0 4.5	3.4	11.5	2	· 2
COMPONENT TOTAL			0.5 0.7		34.6 44.6	77.0 100.0	18.3 29.7	61.8 100.0		
42054 CENERATUR AC										
REPLACE 020 WORN, CHAFED, FRAYED 093 HISSING PART 374 INTERNAL FAILURE 799 NO DEFECT 900 SURNED OR OVERHEATED	3N	C	1.8	* * * *	22.7 1.2 1.2 5.2 1.7	58.7 3.2 3.2 13.4 4.5	40.8	15.9	1	!
REPAIR 020 WORN, CHAFED, FRAYED 070 BROKEN	N	จิ	9.9		6.7 2.8	17.4 7.3	66.3	258	2	****
OTHER COMPONENT TOTAL 45011 SERVO CYLINCER.HYD	· · · · · · · · · · · · · · · · · · ·		16.2 5.6		9 36	24.0 100.0	147.5 256.7	58.3 100.0		and the same of th
REPLACE 381 LEAKING-INTERNJEXTER 799 NO DEFECT)	3.7	*	44.4 15.5 7.1	.3.6 8.2 3.7	164.4	֥7	2	2
CHECK OF	F D)	4.0		17.6	9.3	70.4	3. 0	3	7)
SPAIR 135 BINDING/STUCK/JAHNED 381 LEAKING-INTERN/EXTER	F D	1	2.0	*	70.7 7.1 17.7	37.3 3.7 9.3		34.7	1	Frost L.
OTHER CGMPONENT TOTAL			4.0 2.9	1	56.8 89.5 1	30.0 1: 00.0 2:	359.8 443.7 1	55.7 20.0		чи нке ментовиния

TABLE XXXIX.			NENT ! HELI			CE RE	QUIRE	MENTS	1	ر و سمان
ALTION REASON/FAILURE MODE	DEE	F	¥A	A.fi	FH	FH	EH/ FH RATE	FH	MA/	-X-X XH/ FH
15006 TAIL ROTOR BLADE			# 	6	, ~ ^ = = = = 1					
REPLACE 190 CRACKED	GN	G	2.9	*	87.7 37.2	17.9 7.6	254.4	6.3	4	4
CHECK 799 NO DEFECT	CFF	0	8.0		94.2 25.7		753.3	18.6	3	2
REPAIR 070 BROKEN 190 CRACKED	GN	D	3.3	#	119.8 14.4 81.5	2.9	399.6	9.9	2	3
REPAIR 190 CRACKET	OFF	Đ	16.0		159.4 81.3		2551.3	62.9	1	Ī
PATOT THEMOTICS			3.4 8.3		25.9 490.0	5.9 160.0	98.0 4056.6	2.4 100.0		
15007 MAIN ROTOR HEAD	ASSY		**************************************		~ 	. #		******		
REPLACE 020 MORN.CHAFED.FRAYED 070 BRCKEN 799 MD DEFECT 800 NO-DEF/OTHER MAINT 803 NO-DEF/IIME CHANGE 804 NO-DEF/SCHED MAINT		D	28.7	* *	5.4 5.5 4.3 7.8	7.1 3.5 6.0 4.7	1105.5	29.9	good	2
CHECK	ON	0	7.7		6.4	7.1	49.4	1.3	3	3
CHECK	CFF	Đ	59.9		22.5	24.7	1348.2	36.5	ž	Ī
OTHER COMPONENT TOTAL			50.7 40.6		23.6 91.0	25.9 100.0	1195.1 3698.3	32.3 100.0		
15016 ROTARY DAMPER AS	SEPBL	7		***************************************					**=-	* ** **
REPLACE 020 HORN, CHAFED, FRAYED 070 BROKEN 093 HISSING PART 381 LEAKING-INTERN/EXTE 540 PUNCTURED 748 FRED ERRATIC/INCORD 800 NO-DEF/SCHED MAINT	e T	0	3.2	***	5.5 1.8 1.8 12.8 1.8 1.8	334.5 57.2 19.0 19.0 132.5 19.0 13.3	103.1	9.9	•	3

TABI	SE X	XXI	X - (Conti	inued					
REASON/FAILURE HODE	OFF A/C	É	₽A AVG	NO PEN	FH PATE	FH PCNT	PH/ FH Rate	fh PCNT	MA/ Fh	≓H/ FH
					32.1	333.3	256.8	24.7	2	1
REPAIR 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE 690 VIBRATION EXCESSIVE	OFF R R	Đ	16.0	ŧ	1.1		154.1	14.8	3	2
OTHER COMPONENT TOTAL			16.0 14.0		0.0 73.9	0.0 100.0	523.9 1037.9	50.5 100.0		
15021 TAIL ROTOK HEAD				*****						
REPLACE 020 WORN, CHAFED, FRAYED 374 INTERNAL FAILURE 381 LEAKING-INTERN/EXTE 799 NO DEFECT 800 NO-DEF/OTHER MAINT 803 NO-DEF/TIME CHANGE	R		948	* * * *	4.9 1.6 9.2 6.4 1.6	69.0 11.0 3.7 18.2 14.3 3.7 18.2		40.9	group.	Z
CHECK 799 NO DEFECT	QFF	D	40.0	•	9.6 2.1	21.4 4.8	385.2	51.8	Z	1
REPAIR 730 LOOSE	CN	0	3.3	•	3.2 3.2	7.1 7.1	10-7	1.4	3	3
OTHER COMPONENT TOTAL			40.5 16.5			_	43.3 743.3			
15077 DROOP RESTRAINER										
REPLACE 020 WGRN, CHAFED, FRAYED 070 BROKEN 093 MISSING PART 135 BINDING/STUCK/JAMME 190 CRACKEG 760 BENT, BUCKLEO, SIC		0	1+5	4	10.7 10.7 2.7 5.1 2.7	24.4	చ ్దే • రే	52.3	grow di	Mensilla .
OTHER COMPONENT TOTAL			#9## P.S		_		59.6 125.4			

Tabi	Æ X	XXI	:X - (Cont.	inued					
ACTION REASON/FAILURE MODE	CFF	£	уч./ У2 Дуб	A.C	FH	FH		FH	#	KH/
15208 BEARING					*****			x =		
REPLACE 020 WORN, CHAFED, FRAYED	QN	0	1.4		.7.8 24.2		39.0	48.5	e e e e e e e e e e e e e e e e e e e	1
OTHER COMPONENT TOTAL			37.6 2.8				41.3 80.3			
22005 ENGINE										
REPLACE 799 NO GEFECT 804 NO-DEF/SCHEO HAINT	QN	Đ	52-8	*	117.7 16.6 12.4	33.6 4.8 3.5	6213.5	100.5	1	Tang.
CHECK	QFF	Đ	40.0		23.5	6.7	941.7	15.2	5	3
ADJUST 127 ADJST/ALIGN IMPROPE	CN R	D	3+2	*		22.3 12.7	247.9	4.0	2	5
REPAIR 190 CRACKED	ON	D	6.9		50.3 12.6	_	347-3	5.6	3	4
REPAIR	OFF	D	60°C		24.5	7.0	1968.8	31.9	4	2
OTHER COMPONENT TOTAL			C. C 27-8		55.6 349.9		0.0 9719.2	C-0 100.0		
22028 TAIL PIPE ASSY	7****									
REPLACE 020 WORD, CHAFED, FRAYED 070 BROAFN 190 CRACKED	CN	Ü	1-8	*	113.4 7.9 39.6 52.7	6.1 30.6	204+2	41.,	1	#Bug#
REPAIR 190 CRACKED	ΟN	Ĩ	Z•4			9.9 5.8	31.1	6.3	2	2
OTHER COMPONENT TOTAL			80.4 3.8		3.2 129.5	2.5 100.0	258.0 493.3	52.3 100.0		
22037 FUEL CONTROL										
REPLACE 020 WGRN, CHAFED, FRAYED 537 LOW PCKER OR THRUST 374 L.IERWAL FAILURE 127 ADJST/ALIGN IMPROPE 381 LEAKING-INTERNYEXTE 803 NG-CEF/TIME CHANGE	Ą	0	6.4	* * * * *	1.2 1.2 2.4 1.2		143.8	48.7	1	grodi

TAB.	LE X	XX	IX -	Cont	inued					
ACTION REASON/FAILURE HODE	OFF	E	₽A	NC	FH	FH	PH/ FH Rate	FH	MA.	PH/
ADJUST 127 HDJST/ALIGN TMPROPE	CN R	D	1.0	*	4.3 4.3	13.8 13.8	4.3	i i	2	Ž
OTHER COMPONENT TOTAL			34.4 9.5		4.3 31.0	13.8 100.0	147.1 295.2	49.8 100.0		
22043 PARTICLE SEPARAT	CR									
REPLACE OZO WORN, CHAFED, FRAYED OZO BROKEN OZO MISSING F4P1 BOO NO-DEF/OZHER MAINT ZZO NO DEFECT			5.5	* * * * *	1.3 1.3	46.7 8.3 8.3 8.3 8.3	41.2	15.9		· ·
CHECK 800 NO-DEF/OTHER HAINT	CFF	D	à. C	*	3.2 1.1	20 <u>-6</u> 6.7	25.7	9.9	2	2
OTHER COMPONEN? TOTAL			36.0 16.2		5.3 16.0	33.3 100.0	192.6 259.5	*4.2 100.0		
22100 EAPS BLOWER										
REPLACE 3 NOISY 020 WORN, CHAFED, FRAYED 070 BROKEN 246 IMPROPYFAULTY MAINT 330 EXCESSIVE HUM 374 INTERNAL FAILLRE			3.4	*	1.4 5.9 1.4 2.4	6.7 33.9 6.7 6.7	51.0	63.4	Hend	Hunde
OTHER COMPONENT TOTAL			5.5 4.0		5.3 20.3	26.2 106.0	29.5 80.5	36.6 100.0		
22150 STARTER										
REPLACE 381 LEAKING-INTERN/EXTE	CN R	0	2.6	*	7.5 7.5	77.9 77.9	19.5	41.7	\$	9
CHECK	CH	a	0.1		21,4	222.2	1.6	3.4	1	2
OTHER COMPONENT TOTAL			Q.3 1.6				25.4 44.5			

ACTION REASON/FAILURE HODE	GN/ CFF	L	84/ 84	ave ac	##/ #8	死 <i>]</i> 表現	<i>FF1</i> FR	<i>Fr.)</i> Fit	3-1 31/	-5-1 -5-1
REASON/FAILURE HODE	≜/C	¥	AVC	rEx.	- 141	PCA	#27E	₹	25	
22113 ANTI ICING VALVE				*		- 1 - 1				<u>-</u>
REPLACE 020 WORN, CHAFED, TRAYED 070 BROKEN	C 24	0	1.3		15.9	87.6	19.5	27.4	1	•
020 WORY, CHAFED, FRAYED 070 EROKEN				*	1.5	1. 1			-	•
ISS MISSING CLASSICALS				#	1.5	\$.1				
374 INTERNAL FAILURE 381 LEAKING-INTERN/EXTE				· · · · · · · · · · · · · · · · · · ·	1.5 1.5	9 - 5 - 3 				
381 LEAKING-INTERN/EXTE	R			*	1.5	8.8	F E			
730 0754				¥	1-5 3-0	3. 4				
900 BURNED OR OVERHEATE					3.0	17.5				
			1.5				1.5			Ž
OTHER. COMPONENT TOTAL			49. <u>I</u>		1.0	6.0	55.1	70.4		
Verterni iuial			4. ₹		17+1	100.0	71.2	100.0		
22389 ANT! ICE SENSOR										
REPLACE		đ	1_4		9.1	44. 9		23a 4		_
REPLACE 730 LOGSE		•		*	2.1	46.7	*= 1	63.7	4	<u>.</u>
070 BEGKER	Ç#	Ţ,	Q4.3	*	1-1	33.3	0.5	•••	2	2
***	-			•						
OTHER COMPONENT SOTAL			0. 5		0.0	0-0	1±3 5±5	Zİ.E		
LUXPUNENT SQUAL			1.4		3.2	1.69.C	5⊽	190.0		
24014 APP ENGINE							- 			
REPLACE OF BROKEN	Œ	Đ	6. 4		2.1	4.5	14.7	1 2	*	- ·
970 BADKEN 410 LACK OF/IMPROP LUBE				\$	5 ±1	4.8	4.2.2	***	-	2
AND THEY MATERIAL FORE				李	1.1	4-8	13.7			
			40.0		-5±4	7排.6	255.8	22.3	2	2
REPAIR 135 BINDING/STUCK/JUNKED		O	60. n		11 <u>.</u> Q	£1_#	671 1	-		
135 SINDING/STUCK/JAMED				#	1-1	448	62420	#4.+ **	å	ı
374 INTERSAL FAILURE		-		9	4.4	28.8				
135 BINDING/STUCK/JAHRED 374 INTERNAL FAILURE 381 LEAKING-INTERNYEXTER 710 886 FAILING/FALLTY				# #	1-1 1-1	4.8				
ATUES				_						
COMPONENT TOTAL			&C. Q		0.0	6.0	44.4	3.4		

TAB	LE 2	XX)	- X	Cont	inued			-		
ACTION PEASON/FAILURE MODE	137	E	₽å	AC.	FH	514	FR	PR/ FH PCMT	424.7	N-X FH FH
24.03 459 CLUTCH ASSY										
Specific to the second		- CO	₹.3	*	1.3 1.9 5.7	4.2 22.9	37.0	<u> 5.2</u> 2	¥od	
	QFF	9	8.9				25.7	9.2	ż	3
**************************************	ŌŻ	Ō	2. €					2.1		e E
**************************************	of f	Đ	16. O					35.7		
JINER			34, 5		3.2	10.2	108.9	3d.9	~	₹.
COMPONENT TOTAL			\$.û 		31.0	160.5	280.2	100.0		
Z4040 APP FUEL CONTROL RPLACE 273 MISSING PART 127 ADJST/ALIGN IPPROPE Z36 TRIY 315 FOR FLUCTUATION 374 INTERNAL FAILLRE 381 LEAKING-INTERN/EXTE- 525 PRESSURE INCORRECT 910 CHIPPED			3+4	* * * * * *	tend Poly train took doors park to the first to the pred book pred pred pred park	4.2 4.2 4.2 4.2 8.3 4.2 12.5	65.5	67.0	e de maior	enne)
ARJUST 127 AEJST/ALIGN IMPEDPE	Č M	ū	9 .\$	•	5.3 3.2	20.8 12.5	4,]	4.2	-	Z
OTHER CURPONENT TOTAL			30.4 4.0		1-1 25 ₋ 7 :	4.2	32.5 E.SOI	31.\$ 100.0		The state of the s
24159 APP STARTER					 -			*****		
REPLACE 070 BROKEN 135 BINDING/STUCK/MME: 190 CRACKEN 374 INTERNAL FAILURE 585 SPEARED 600 MD-DEF/STHER WAINT		O	3.1	* * * * * *	25.25	27.3 9.1 9.1 27.3 9.1	39.8	9 9.7	guye ^a	
COMPONENT 1314F						9.0 60.3	0.1 39.9			HIMMINGGUINGG

TAFI	FY	79	IX -	(inued					
						- 				حمستم
***************************************	CN/	L	PH/	AVG	PA/	FA/	## <i>/</i>	#H/	R -≜	-H-K
ACTION REASON/FAILURE MODE	GPF A/C	¥	PA AVG	nu Yen	PA 15	PCNT	PH RATE	PCNT	HA/ FH	HH/ FK
24167 APP FUEL PUPP	* T Z W =			****			* * * * * * * * *			****
REPLACE 335 BINDING/SYGK/JANHER	Oh	O	4.4		3.2	59.4	14.1	45.0	1	1
135 BIMDING/SPULK/JAMME 374 INTERNAL FAILLRE					1.1 2.2					
JIT INICHMAL CHILGAE				•	2.42	2740				
ě CHECK	ON	0	C. O		2.1	39.5	0.0	0.0	2	Đ
I OTHER			345.6		0.6	0.9	17.3	50		
OTHER COMPONENT TOTAL			5. S		5.4	100-0	31.4	100.0		
26011 MAIN GEAR BCX			in kage T		, <i>, , , , , , , , , , , , , , , , ,</i> ,					
REPLACE .	CA	D	97.7		22.5	15.6	2199.2	101.2	1	1
BO3 NO-DEF/TIME CHANGE			_	Ŧ	5.7	3.9	2199.2			_
CHECK	OFF	Ğ	48.0		9.6	_ 6+7	462-2	21.3	2	2
OTHER			Ç. G		112.4	77.8	0.0	0.0		
COMPONENT TOTAL			18.4		144.3	150.0	2661.5	100.0		
26019 TAIL ROTOR GEAR (OX									
REPLACE	GN	Đ	20. e			57.5	511.7	56.2	1	1
Į 176 COKRODEO				*		22.5				
I 190 CRACKED 374 INTERMAL FAILLRE					4.3 1.1	10.0				
381 LEAKING-INTERNEXTER			~	*	1-1	7.5				
799 NO LEFECT	•				2.1	5.0				
800 NO-OEF/GTHER MAINT			-	*	2.1	5.0				
803 NO-DEF/TIME CHANGE				4	4.3	10.G				
of the Carlos	GH	0	35.8		4.3	1Ç.O	157.3	17.3	3	2
799 NO CEFECT		_		*		5.0				
804 NO-DEF/SCHED MAINT				#	Z-1	5-0		-		
in the CK	OFF	D	8.1		4-2	9.9	34.2	3.8	4	4
799 40 CEFECT			-			4.9		-		
. 800 NS-ÚEF/OIHER PASNT				\$	1-1	2.5				
repair	QFF	D	24.0				128.4	14.1	Z	3
306 CONTARINATION	_			3	1-1					
i 350 INSULATION EREAKDOW i 381 LEAKING-INTERN/EXTER	-			* *	1.1 1.1					
602 FAIL DUE ASSOC EQUI				*	1-1					
CIHE			18.1		z 3	1A.F	76.3	5 £		
COMPONENT TOTAL			21.3				910.1			
							-	-		

TAB	IC 1	(XX	IX -	Cont	inued					
REASON/FAILURE MODE	urr A/C	¥	ya Ayg	YEN YC	FH R≜TE	FH PCHT	PH/ FH RATE	F# P##T	RL/	FH/
Z6DZ9 BEARING	···			·						
REPLACE 020 WGRN, CHAFEO, FRAYED 117 DETERIORATED 374 INTERNAL FAILURE 381 LEAKING-INTERN/EXTE 799 NO DEFECT		0	4.7	*	10,4 39.0	12.8 48.0	372.1	75•2	****	ı
803 NO-DEF/TIME CHANGE					10.4	4.0 12.8				
							2.1		Ž	2
OTHER COMPGNENT TOTAL			114.5	-	1.0 81.3	1.3 100.0	120.3 494.6	24.3 100.0		
26040 ROTOR BRAKE SEAL					- · · · · · · · ·					
REPLACE 020 WGRN, CHAFED, FRAYED 127 AGJST/ALIGN IMPROPE 381 LEAKING-INTERN/EXTE	CN S S	0	9.2	* *	27.6 2.2 2.2 23.6	78.8 6.3 5.3 67.0	255.5	94.0	- Brood	1
CHECK	ON	C	2.7		7.5	21.2	20.3	7.5	*	ż
COMPONENT TOTAL			7.8	-	35.3	190.0	276.3	109.0		
26042 INTERHEDIATE GEAR	1 80x		·					******		
REPLACE 070 BRCKEN 170 CORRODED 190 CRACKED 374 INTERNAL FAILURE 799 AO DEFECT 800 NO-DEF/OTHER MAINT 803 ND-DES/TIME CHANGE		£9	7.1	* * * * * *	To the sent year of the party and pa	10.8 13.0 2.7 4.3	129.4	49.8	(June)	1
CHECK	CN	Ō	1.9		4.3	10.9	8.0	3.1	3	Ą
CHECK	OFF	Ō	£.0		3.2	8.1	25.7	9,9	4	3
070 BROXEN 190 CRACKED 381 LEAKING-INTERN/EXTER 900 BURNEC OR OVERHEATED 935 SCORED OR SCRATCHED		Đ	2.8	*	10 To 4 To 50 July 10	4.3 4.3 4.3	33.0	12.7	Philips 1	
OTHER COMPONENT TOTAL			30. E		2.1 39.6	5.2 100.0	63.5 255.7	24.5 169.0		

TABLE XXXIX - Continued											
ACTION TEASON/FAILURE MODE	CN/ CFF Ł/C	Į	74/ 74 440	AYS AC PEN	PA/ FH PATE	PA/ FH PCNT	ESV FH PATT	FEV FE FCFT	3-1 81/ 17	-N- 730 FB	
26U66 CIL YURP		*		.							
REPLACE OTO BROKEN 381 LEAKING-INTERM/EXTER TOO HO DEFECT BOD NO-DEF/DITTER NAINT 803 NO-DEF/TIME CHANGE			5.0	* * * *	Property and the second	92.7 9.3 9.3 37.1 9.3 27.8	69.5	92.7	2	Ź	
COMPONENT SOTAL 26083 ROTOR BRAKE SEAL			5. 6 5. 0		1.1		5.4 75 ₄ 0	7.3 100.0			
REPLACE 304 UNIDENTIFIED BY CODE 306 CONTANINATION 381 LEAKING-INTERMICATION	CN	o	7.1	*	600 to 10	60.a 7.0 7.0	151.9	135.2	****	#m.	
CONTURCE: 10 IAL	·		7.1		21.4]	05. 0	151.9	160.0			
REPLACE OTO BROKEN OPE MISHATCHED 170 CORROCED 190 CRACKED 760 BENT, BUCKLED, ENC 799 ND DEFECT			1.9	* * * * * * *	And the same and same care of the same c	00.0 10.5 10.5 10.5 10.5 10.5	62. \$	\$7.5	1	9112	
OTHER COMPERENT TOTAL			1.9 4.5		0.0 16.1 14	0.0 10.0	A.0 71.€ 1	12.3 100.0			
cozzy smift Assy, Tail Ro	TOR					المسيدي المسيد					
REPLACE G 425 HICKEC 910 CHIPPEO		D	2.6	7 *		6.7 4.7	25.2 1		Sec.		
COMPCHENT TOTAL					9.7 10		25.2 1	49.0			

ACTION REASON/FAILURE MODE	Cr-F	₽.	PA	NG	FH	#A/ FH PCNT	FH	F-24	MA/	MH/
26260 CHIP DETECTOR			* ** ** ** ** **					~		
REPLACE 070 BROKEN 190 CRACKED 799 NO DEFECT	ON	0	1.6	\$ \$	1.1	33.3 11.1 11.1	5.1	31.3	2	2
REPAIR 973 BROKEN 190 CRACKED 255 NO OUTPUT	NC	Ů	1.8	*	5.3 2.1 1.1 1.1	55.6 22.2 11.1 11.1	9,4	57.5	1	1
OTHER COMPONENT TOTAL			1.7			11.1	1.8 16.4	11.1		
26329 SHAFT ASSY, TAIL	ROTOR		~~~~			*****		, week		
REPLACE 020 WORN, CHAFED, FRAYED 458 OUT OF BALANCE 800 NO-DEF/OTHER MAINT		D	2.5	* *	5.3 1.1 1.1 3.2	99.1 19.8 19.8 59.4	13.4	142.0	1	1
OTHER COMPONENT TOTAL		•	C. 0 2. 5		0.0 5.4	0.9	0.0 13.4	0.0		
42134 GENERATOR										
REPLACE 800 NO-DEF/OTHER MAINT 070 BROKEN 190 CRACKED 255 NO OUTPUT 374 INTERNAL FAILURE 585 SHEARED 800 NO-DEF/OTHER MAINT		0	2.0	* * *	4.3 10.0 2.0 2.0	5.4 5.4 10.6	68.5	123.1	1	1
OTHER COMPONENT TOTAL			C.0 1.8		3.2 37.4	8.6 100.0	0.0 68.5	0.0		

TABL	E XX	KXI	x - c	Cont:	inued			···		
REASON/FAILURE MODE	OFF A/C	E V	MA	PEN PEN	FH Rate	FH	KH/ FH RATE	FH	MA/	MH.
45010 HAIN ROTOR SERVO	UNIT	S								
REPLACE OZO WORN, CHAFED, FRAYED 381 LEAKING-INYERN/EXTE: 799 NO DEFECT 803 NO-DEF/IIME CHANGE		D	3•2	* * *	40.7 4.7 9.4 7.8 12.5	36.9 4.2 3.5 7.1 11.4	130-1	4.6	3	3
CHECK 730 LOOSE 799 NO DEFECT 600 NO-DEF/OTHER MAINT		D	1.5	4	353.1 21.5 203.4 32.1	19.5 184.6	543.6	19.2	1	Z
REPAIR 029 CURRENT INCORRECT 070 BROKEN 111 BURST OR RUPTURED 374 INTERNAL FAILURE 381 LEAKING-INTERN/EXTER 710 BRG FAILING/FALLTY	₹.	D	16.0	* * *	117.7 10.7 10.7 10.7 10.7 21.4 10.7	9.7 9.7 9.7 9.7	1833.2	66.5	2	1
OTHER COMPONENT TOTAL			16.0 5.5		0.0 511.5	0.0 100.0	276.0 2832.9	9.7 100.0		
57027 AFSC SERVO CYLIN	_		~							
REFLACE 374 INTERNAL FAILURE 803 NO-DEF/TIME CHANGE	CN	D	7.1	*	7.5 1.3 6.2	33.3 5.6 27.8	53.2	9.3	1	2
CHECK 799 NO DEFECT 500 NO-DEF/OTHER MAINT		D	8.0	*	5.3 2.1 1.1	23.8 9.5 4.8	42.8	7.5	2	3
REPAIR 177 ACUST/ALIGN IMPROPE 374 INTERNAL FAILLRE	OFF R	D	16.0	*	5.3 1.1 2.1	23.8 4.8 9.5	85.6	15.0	3	1
OTHER COMPONENT TOTAL			90.9 25.4				389.0 570.5			
57420 AFSC AMPLIFIER	****						#####			
REPLACE 020 WORN, CHAFED, FRAYED	ON	٥	1.1	•	2.1 1.1	100.0	2.4	55-1	1	4
OTHER COMPONENT TOTAL			1-1 2-0		0.0 2.1	0.0 100.0	1-9 4-3	44.9 100.0		